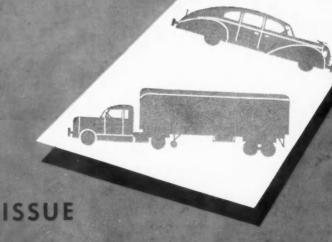
MARCH 15, 1948

198 #5

30th ANNUAL STATISTICAL ISSUE



# AUTOMOTIVE INDUSTRIES



A Figure and Fact Record, Comprehensive and Comparative, of the Accomplishments of the Automotive Industries, Currently and Over the Past Years
Statistics of the Automotive Industries
Specifications of their Principal Products
Basic Industrial Data

Table of Contents, Page 3

## **COMPLETELY NEW!**

## Completely Automatic GRINDING!



 Automatic loading and positioning of parts in workhead of new Madel 281 Centerless.



 Model 381 Centerless workhead with new automatic loading device for large work.

#### On a brand new line of Heald Centerless Internals

There's no comparing these new Heald Centerless Internals with any others. From base to bridge, they're completely new—completely different in design and performance. And they handle a wide range of cylindrical work—wider than ever before.

Peg your production rates high. For these are high-capacity, high-production, high-precision machines...each with continuous and completely automatic cycle (loading through unloading)...each grinding "the centerless way" for uniform wall thickness, perfect concentricity, and errorless reloading. They offer you:

GREATER ACCURACY AND PRODUCTION. Base and wheelslide more rigid... feeds and table action uniformly constant throughout the day, remaining so without adjustment... wheelhead and work rotation smoother.

QUICKER SETUP. Individual, graduated knobs set feed rates and table speeds...quickly adjusted reverse dogs set table stroke.

front for easy accessibility...steel hydraulic tubing means leak-proof joints...electrical controls grouped at rear...isolated power unit rolls out from base.

Consult Heald branch office nearest you, or write for free bulletin on the 281-381 Centerless Internal Grinding Machines.



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#### THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago · Cleveland · Dayton · Detroit · Indianapolis · Lansing · New York



## WAUKESHA ENGINES

• Yes, sir, Mr. Sidewalk Superintendent, she made the grade all right. But it's not surprising that you wondered whether the truck could do it.

The truck driver wasn't worried. Not for a moment. He and his truck have been in tougher spots than that. But their Waukesha Engine pulls 'em both out every time. "Nuthin' to it," says he. "What those Waukeshas haven't got they don't need. They've got the horsepower—and I've got the horse sense to use it right."

The boss contractor isn't worried either. And he has to think of his trucks in terms of power costs, as well as power. That's why he *specifies* Waukesha Engines. He's buying dependability—with fuel and maintenance economy—when he buys Waukeshas.

Take the Model 148-DK Waukesha Diesel shown. 200 hp. at 2100 r.p.m. Six cylinders, 5½ in. bore x 6 in. stroke, 779 cu. in. displ. At full output its exhaust is remarkably clean. It has a 7-bearing accurately balanced crankshaft—with crankpins and main bearings hardened to 600 Brinell. Removable wet sleeve cylinders, hardened to 400 Brinell. Chrome silicon alloy intake and exhaust valves; both valve seats are Stellite inserts. Full pressure lubrication. Big capacity oil filter. 24 volt electric starting system. Why not get all the details? Send for Bulletin 1413.

### WAUKESHA MOTOR COMPANY WAUKESHA, WIS.

NEW YORK . TULSA . LOS ANGELES

March 15, 1948

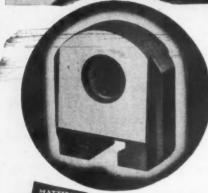
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Write for Free Set-Up Book showing how others have reduced time and cut costs with Mattison Grinders.

#### Assembled Without Gasket TO WITHSTAND 600 LB. PRESSURE

Users of Mattison Grinders, having parts which must be assembled without gaskets, are getting results in accuracy and fine finish that eliminate the lapping operation in most cases. One example is the gate valve disc shown in the picture.

They are ground on a real production basis - 100% increase over previous method to a close degree of accuracy and are assembled without the use of gaskets to withstand pressures up to 600 lbs. There is no lapping operation. Material is Exelloy 325 Brinell.

This is only one example showing the capability of the Mattison Grinder. Further examples are shown in the Mattison Set-Up Book.

ROCKFORD · ILLINOIS

New: Profi Re Our Gene 44

Auto Aero SPEC 19 Tr

> New New Publ Busin Airb Cale

> > Man

## UTTOMOTHVE

Published Semi-Monthly

March 15, 1948

Vol. 98, No. 5

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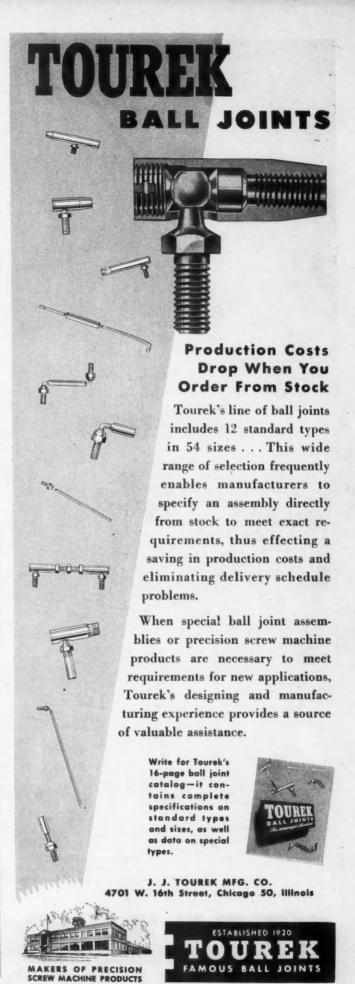
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March 15, 1948







Future SCRAP NEEDS to be Even Greater

Two automobile manufacturing collection agencies to get surprise Wednesday appealed to their firms Wednesday appealed to their firms Wednesday appealed to their metal flowing toward the mills.

The wednesday appealed to their metal flowing toward the mills and country control of automobiles by turning duction of automobiles by turning duction of automobiles by turning duction flowing the mills.

The steel industry industry in this country requires 30 to 50 tons of screp arises the flow of acrap to steel mills. General Motor Corp., and that unit in the called on its increased, 1948 automotive process and office of seek went into an emission of seek went into so to seek went into an emissi

Reep our coday, the coday the the milis the milis the regular.

The newspaper clipping reproduced

The newspaper clipping reproduced above tells the story of the continued scrap shortage which faces American Industry.

Today's expanding economy is faced with growing shortages of iron, steel and other needed metals. Expanded capacity of mills, smelters and foundries is only part of the answer.

They cannot produce at full capacity without more usable scrap metal. Increased use of baled sheet metal scrap can help take up the "slack" in the scrap cycle . . . not only now, but in the years ahead.

If you are not baling your sheet metal scrap...plan to do so as soon as possible... to help provide your own supply of new metal in the future. There's a Galland-Henning Hydraulic Baler of proper size and capacity to meet your future baling needs. The important thing is to plan for it now. Write —

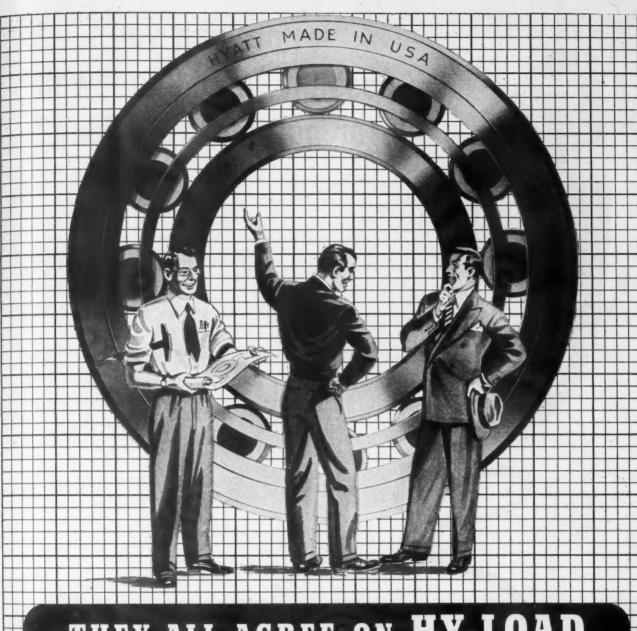
GALLAND-HENNING MFG. CO.

2747 SOUTH 31st STREET . MILWAUKEE 7, WISCONSIN

## GALLAND-HENNING

SCRAP METAL BALING PRESSES

A 5376-1P



#### ON HY-LOAD THEY ALL AGREE

DESIGN ENGINEERS LIKE the wide flexibility in machine design afforded by Hyatt Hy-Load Roller Bearings. TEN major types-greater load

carrying capacity-for more compact, more efficient, more economical automotive and equipment design.

PRODUCTION MEN LIKE

the faster production schedules made possible by Hyatt Roller Bearings, The separable Hy-Load bearing parts are freely interchangeable: thus, when subassemblies meet for final assembly, no fussy selection or matching is required. Time and labor are saved.

CUSTOMERS LIKE

the smoother, quieter performance . . . longer life and care. free operation ... for which Hy-Load Bearings have been recognized leaders for over half a century. For all-around satisfaction, depend on Hyatt. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J. and Detroit, Michigan.

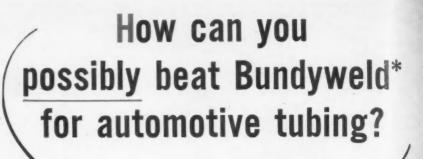
ROLLER BEARINGS

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Amazing benefits result from one little difference!

The difference between Bundyweld tubing and ordinary tubing, for instance. It's not such a small difference, at that: Bundyweld is double-walled from a single strip of metal. See half a dozen of the major advantages this exclusive construction gives you, listed below.

Strong, vibration-resistant, held to close dimensions-Bundyweld is actually designed to meet the exacting needs of the automotive industry.

You'll want all the facts, of course. The Bundy representative or distributor nearest you will be glad to give them to you-you'll find his name at the foot of this ad. Or you can contact us directly: Bundy Tubing Company, Detroit 14, Michigan.



IT'S DOUBLE-WALLED FROM A SINGLE STRIP-STRONGER!



HIGH FATIGUE STRENGTH -WITHSTANDS VIBRATION!



**KEPT TO REALLY CLOSE DIMENSIONS!** 



COST OF BUNDYWELD IS LOW!

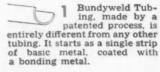


WITHSTANDS HIGH PRESSURES WITHOUT LEAKING OR BURSTING!

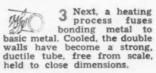


FAST AND EASY TO CUT, FORM OR JOIN!

#### WHY BUNDYWELD IS BETTER TUBING



2 This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance. cold-rolled strip.



4 Bundyweld comes in standard sizes, up to %"
O.D., in steel (copper or time coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.



-BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES:-

Standard Tube Sales Corp. 76-01 Woodhaven Blvd. Brooklyn 27, N.Y.

Peirson-Deakins Co.

823-824 Chattanooga Bank Bldg
Chattanooga 2, Tenn.

Lopham-Hickey Co.
3333 W. 47th Place
Chicago 32, III.

Chicago 32, III.

Rutan & Co.
404 Architects Bldg.
3100 19th St.
Philadelphia 3, Pa. San Francisco 10. Calif.

Eagle Metals Co. 3628 E Marginal Way Seattle 4, Wash.

Alloy Metal Sales, Ltd.

-Bundyweld nickel and Monel tubing is sold by International Nickel Company distributors in all principal cities.

# no other piston ring maker can do this

# for no other piston ring maker has this!

Month after month, in its "Post" advertising, Muskegon tells car owners to patronize "Factory Authorized" outlets for all services, parts and accessories. No other piston ring maker can do this! Why not? Because only Muskegon has the policy that makes this type of advertising possible. Read this policy now. You will see at once the great advantage it gives you. Muskegon Piston Ring Co., Muskegon, Michigan. Plants at Muskegon and Sparta.

Appearing in March 27

## Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."



"... and my experience and training prompt me always to turn for advice to a specialist. So when my car needs service, I see a car specialist ..."



"Car specialist is exactly what I am!
'Factory Authorized Service Man' is the
name to remember me by. That means
the car maker trained me intensively
to know everything about your particular make of car . . . and qualified me to
offer you the very finest service,
accessories and parts. I'm authorized,
for instance, to recommend new piston
rings, tested and proved especially
for worn engines by the same men who
designed your car's original rings.
Look me up in your classified phone
directory under 'Automobile Dealers'
or 'Automobile Repairing and Service'."



"THE ENGINE BUILDERS' SOURCE"

## GISHOLT TURRET LA



Finger-tip spindle co starts, stap reverses the Saves timeeffort--saves It's power-operated. Clutching and

buttons. Instant respons cuts time lag, step

GISHOLT MACHINE

COMPANY Madison 3, Wisconsin



The GISHOLT Round Table represents the collective experience of specialists in the machining, surfacefinishing, and balancing of round and partly round parts. Your problems are welcomed here.

automatic lathes

superfinishers

balancers

ecial machine

braking are as easy as pressing

In the following pages you will have a state of sealing materials of the many variables influencing the choice of sealing materials. This information has been compiled by Armstrong from thousands of problems solved during the past 35 years. Since minor design details often influence the selection of a sealing material, we say that the particular with your particular particular with your season particular and particular with your season particular and p

#### DESIGNING FLANGES FOR EFFICIENT SEALING

Since the satisfactory functioning of a unit may depend upon maintaining a tight seal at some point, that seal merits at the me

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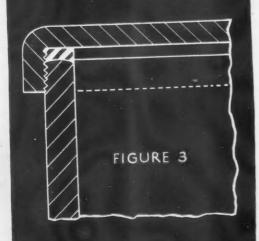
## DESIGNING FLANGES FOR EFFICIENT SEALING

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FIGURE 1

FIGURE 2

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Proper flange design is only one of the many sealing problems discussed in the new 20page booklet, "Armstrong's Gasket and Sealing Materials."

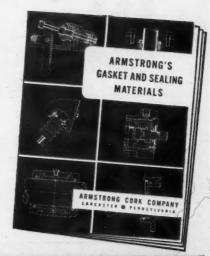
This booklet offers you practical help in the selection and use of resilient sealing materials. Ten technical discussions cover most of the variables that influence the design of gaskets and gasketed joints. In addition, "Armstrong's Gasket and Sealing Materials" contains physical data on the five major types of sealing materials offered by Armstrong: synthetic rubber compounds, corkand-synthetic-rubber compositions, cork compositions, fiber

Partial Contents: Designing Gaskets to Reduce Cost, Effect of Gasket Width on Compression, Effect of Surface Condition on Gaskets, Factors in Choosing Resilient Gaskets, Proper Compression for Resilient Gaskets, Relation of Gasket Thickness to Load, and others. sheet packings, rag felt paper.

Whether designer, engineer, or purchasing agent, you will find "Armstrong's Gasket and Sealing Materials" a helpful addition to your files. Refer to it whenever you need data to make tentative selections of suitable resilient gaskets or sealing materials. Write for your copy today to Armstrong Cork Co., Gaskets and

Packings Dept., 1503 Arch St., Lancaster, Pa,





ARMSTRONG'S GASKETS . PACKINGS . SEALS



ular style of ail bath air ner used on trucks where ner is mounted directly

er affords real dust protec-tion for small engines used on garden tractors, power lawn ers, motor scoolers and





al type Mitchell ignition switch used on popular makes of cars and trucks.

This United oil bath air cleaner is designed especially to protect Diesel engines in truck tractor, grader and industrial power units, range of engine speed occurs.





## CALL ON UNITED'S AND PRODUCTION

Behind United Specialties Company is over a quarter century of experience in the development and production of automotive specialties — this, coupled with a constant alertness to new ideas. keeps United products abreast of latest developments in the industry.

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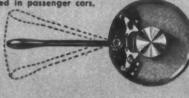
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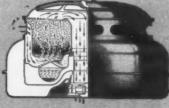
United Air Cleaner Division, in addition to its wheel goods and special stamping contract work, manufactures a complete line of oil bath air cleaners for engines in cars, trucks, buses, tractors, stationary power units - 260 individually designed models to fit every type of internal combustion engine. More than 10,000,000 United Air Cleaners have been produced - over 5,000,000 in the past five years alone.

Mitchell Division offers the semi-automatic directional signal switch - a positive means of indicating turns which renders a notable contribution to driving safety. Mitchell ignition switches, long original equipment on popular make cars and trucks, are precision-built units that will outlast the vehicles on which they are used. In addition Mitchell makes a complete range of metal design and rolled shapes.

101111010101 15 C F 2 3 1 L 7

Metal rolled shapes produced in Philadelphia plant — complete range of metals, designs, gauges, stainless steel, aluminum, brass, branze copper cold ralled, drawn and pressed for automobiles, airplanes, architectural require-ments, railroad cars, radios, all industrial uses. Mitchell built-in type semi-automatic directional signal switch used in passenger cars.





obile combination oil designed for use on down draft carburetors.

## SPECIALIZED ENGINEERING EXPERIENCE

## MITCHELL IMPROVED SEMI-AUTOMATIC DIRECTIONAL SIGNAL SWITCH NOW AVAILABLE IN PACKAGE UNIT

Fleet owners and jobbers in the after-market, as well as manufacturers and suppliers having limited requirements on production items, may secure Mitchell Semi-Automatic Directional Signals in one complete package for use on trucks, buses and "on the highway" tractors.

This package, including Mitchell semi-automatic directional signal switch, lights and wiring harness, will be available through the Grote Manufacturing Co., Bellevue, Kentucky. Inquiries will receive prompt, expert attention.

Mitchell, pioneer in the development of electrical switches and other automotive original equipment items, provides these advanced features in its improved Semi-Automatic Directional Signal Switch:

- Can be installed without removing steering wheel.
- Adapters are available for mounting clamp-on type on steering columns of various diameters.
- Semi-automatic feature eliminates necessity for turning switch off after completing change of direction.
- All moving parts are spring loaded, and cannot interfere with steering or be thrown "out of time" by holding the lever while turning the wheel.
- Truck, bus and tractor type is equipped with indicator light.
- Effortless finger-tip control permits operation without removing either hand from steering wheel.
- Many thousands are giving excellent service as original equipment on motor cars, trucks and buses.

Our sales engineers will be glad to consult with you on your requirements.

#### UNITED SPECIALTIES COMPANY

INITED AIR CLEANER DIVISION . CHICAGO 28, ILL. MITCHELL DIVISION . PHILADELPHIA 36, PA.

AIR CLEANERS \* WHEEL GOODS \* METAL STAMPINGS \* DOVETAILS \* IGNITION AND DIRECTIONAL SIGNAL SWITCHES \* ROLLED SHAPES



Red flash indicates to driver that Directional Signal system is operating properly.

New model Mitchell Truck
Type Clamp-on Semi-Automatic Directional Signal
Switch. It self-cancels when
driver straightens front wheel
of vehicle.

Standard steering wheel mounting unit is  $2\frac{1}{4}$ " o.d. Adapters shown here are available in  $1\frac{1}{2}$ ",  $1\frac{3}{4}$ " and 2" diameters.

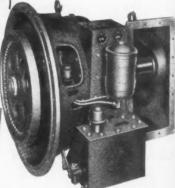




Guesswork as to which gear to use is eliminated when you have a Twin Disc Hydraulic Torque Converter on your excavator... your yarder or loader... or on your oil well drawworks.

A Twin Disc Hydraulic Torque Converter automatically selects and transmits the correct output torque and speed for varying loads within its working capacities . . . allows your engine to run at its most efficient speed. Balance between output torque and speed is automatically accomplished without any mechanical speed change. Also, the cushioning effect of the hydraulic unit protects both the engine and the driven parts against destructive shocks.

Write the Twin Disc Clutch Company, Racine, Wisc., for Bulletin No. 135A which tells the complete story of the advantages obtainable when a Twin Disc Hydraulic Torque Converter is installed. Twin Disc Clutch Company, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



A Twin Disc Hydraulic Torque Converter (Lysholm-Smith type).













SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

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## Save machining time, produce accurate parts

With J&L Precision Ground Cold Finished Steel

The size accuracy and surface finish of J&L Precision Ground Cold Finished Steel is used to advantage by many manufacturers in machining parts. They find it eliminates part of the machining operation, saves tool wear and tool changes. J&L Precision Ground is available in a wide range of grades in sizes ½" and larger from mill or your nearest J&L warehouse or distributor.

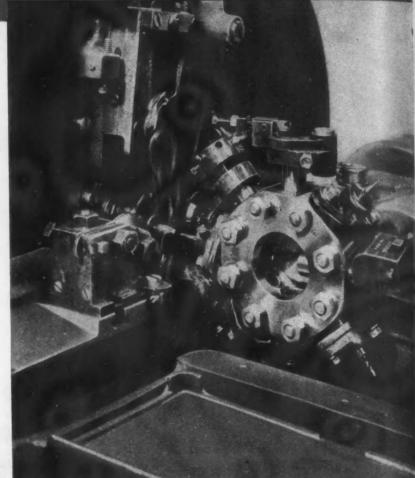
JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

# Improve Performance 6 ways

# USE TEXACO CLEARTEX CUTTING OIL TO ASSURE

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- 2 lower costs
- 3 longer tool life
- 4 improved finish
- 6 fewer rejects
- 6 less machine down-time



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TEXACO CUTTING, SOLUBLE AND GRINDING. OILS FOR FASTER

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Wednesday night. • METROPOLITAN OPERA broadcasts every Saturday afternoon.

### EAT TRANSFER PRODUCTS lerve the Automotive and Industrial Fields



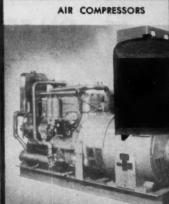
BUS TORQUE CONVERTERS



TRACTORS



POWER UNITS



GENERATOR UNITS



TRUCKS



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ROAD MACHINERY



EARTHMOVERS



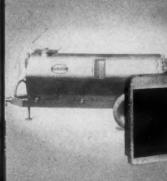
AUTOMOBILES



INDUSTRIAL TRUCKS



DIESEL LOCOMOTIVES



SPRAYERS

The wide variety of application is convincing proof of versatility of Young Heat Transfer Engineering. During the past 20 years, Young research has developed products that are giving dependable service on gas, gasoline and diesel engines throughout the world. Whether the need is for cooling of jacket water, torque converter fluid, lubricating oil, or air . . . there is a Young Product to meet the most exacting requirements.

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HEAT TRANSFER PRODUCTS



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Convectors • Unit Heaters • Heating coils • Cooling coils • Evaporators

· Air conditioning units ·

## TO PUT MACHINE TIME ONLY ON SOUND MATERIAL

The inspector at the Magnaflux MA-3 Unit at right views connecting rods automatically rotated before him under Black Light. Fluorescent \*Magnaglo indications of forging defects are instantly and surely visible as shown above. The same Magnaflux Unit may be used for inspection of a wide range of steering and engine parts; other units for bar stock, etc.



## Let MAGNAFLUX\* find faults first!

Engineered inspection by Magnaflux eliminates defective parts early in production to avoid time lost machining material that must be scrapped when finished. This Magnaflux unit operates in the production line, automatically preparing parts for rapid viewing by the inspector.

Magnaflux makes it possible to concentrate machine time on inherently sound material. Inspection is fast, non-destructive, completely accurate . . . and applicable to a wide variety of parts. For full information write-

\*Magnaflux and Magnaglo, Reg. U. S. Pat. Off., trade marks of Magnaflux Corpor-ation applied to its equip-ment and materials for mag-netic particle inspection.



Reg. U. S. Pat. Office

5904 Northwest Highway, Chicago 31, Illinois

CLEVELAND LOS ANGELES DALLAS NEW YORK DETROIT

16



# CONTINENTAL

Engineering

IN YOUR CUTTING



Tool for forming convex radius

Counterbore cutter with Continental drive

tool you get when you order it from Continental Tool Works . . . it means you're getting the advantage of 29 years of experience in the design and manufacture of a wide range of precision cutting tools.

Continental cutting tools, both standard and special, are helping manufacturers to cut unit costs through better production and longer tool life. Continental's background of engineering and manufacturing

CONTINENTAL ENGINEERING . . . it is an important part of the cutting

experience is at your disposal. Get in touch with Continental today!



Inserted blade face milling cutter



Roughing and finishing doming cutters

Convex form



Shell reamer





Ground flat form tool

41

CONTINENTAL TOOL WORK

SION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

Where do you go for specially built transmissions?



... illustrating more than twenty installutions of transmissions engineered-toorder by COTTA to meet particular requirements of heavy-duty equipment. Helpful reference material. Write today. Cotta Transmission Co., Rockford, Illinois

and the second second

An Assurance Dependable Service COTTA HEAVY-DUTY TRANSMISSIONS

PRECISION-BUILT • SPECIALLY ENGINEERED FOR YOUR PRODUCT

# Consistent Producer

#### of quieter, smoother running

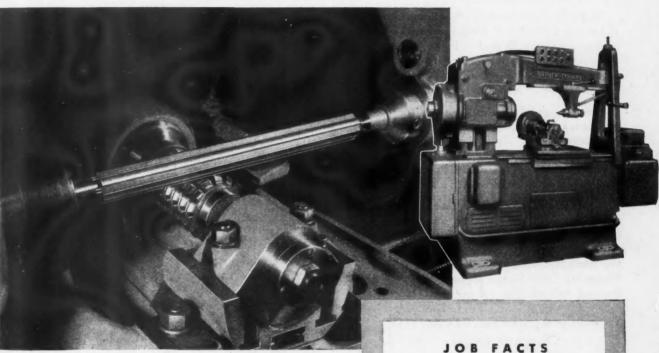
In the field of gear cutting, emphasis is on smoother, quieter running gears, made of tough materials to give dependability and life to the many products of which they become a part. The Barber-Colman No. 16-16 Hobbing Machine is built to meet these exacting production requirements.

Additional improvements and new features provide such accuracy as shown in the job record below, of .0003" parallelism on a 14" spline shaft. The machine has a reversing motor and control for selecting hob rotation; a backlash take-up adjustment on the feed screw; separate rapid traverse motor; and a new dial selector for setting positive stops on carriage travel. All of these new features mean faster and smoother production and improved operating efficiency.

Write for a copy of complete new bulletin describing features, tooling and operation of this Universal Hobbing Machine.

## Barber-Colman Company

GENERAL OFFICES AND PLANT 107 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.



HOBBING SERVICE

Operation — Climb Hob, 6 Key Straight Spline, 14' long

Material - Steel, 152-187 Br.

Feed - .030' per rev.

Speed - 103 R.P.M.

Fl.-to-Fl. Time - 28 minutes

Accuracy - Parallelism over 14', within

Key width held within .001"

# what type seal is best for your design?

How Victor Seal-ology gives the right answer

Under given working conditions, one type of oil seal may or may not be the best. But why should you guess when Seal-ology can say positively yes or no.

Seal-ology as developed by Victor, is the modern science of pre-determining oil seal performance. It does so by first giving recognition in logical order to all factors of application. Then, by carefully providing in proper balance for each condition.

Fluid to be sealed, pressure, shaft speed and operating temperature are important, of course. Yet, Seal-ology begins in Victor Research Laboratories with endless checks and tests of raw materials and seal designs under actual working conditions.

Leader in sealing products research and manufacturing, Victor offers unmatched experience and facilities for producing all types of oil seals, gaskets, packings. When you don't find what you need in the broad Victor line, the Victor engineer in your territory will see that you get it.

Victor Mfg. & Gasket Co., P.O. Box 1333, Chicago 90, Illinois

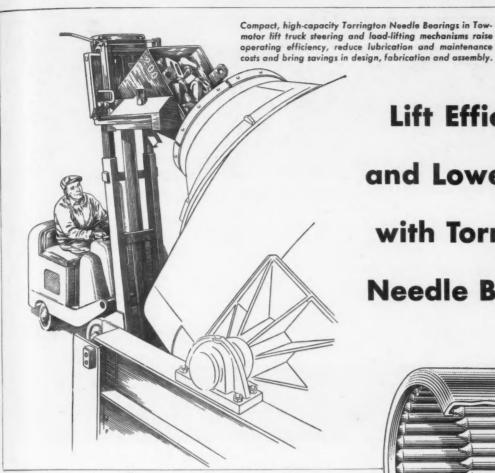


Manufacturers of SEALING PRODUCTS Exclusively

VICTOR



The Greatest Mores in the Danker Industry



Lift Efficiency and Lower Costs with Torrington **Needle Bearings** 



... in operation as well as in design and manufacture, these efficient anti-friction units reduce costs.

ONE WAY to give product efficiency a lift...and to put skids under operating and manufacturing costs...is to use Torrington Needle Bearings.

Check these features with your own product

- 1. High capacity means heavier payload, longer life, greater safety factor.
- 2. Small size allows streamlining, smaller component parts, compact construction.
- 3. Light weight means minimum dead weight, easy handling.
- 4. Low friction coefficient assures reduced power consumption, minimum wear.

5. Efficient lubrication means less maintenance attention, lower lubricating cost.

6. Unit construction provides simplicity of design, ease of assembly.

These cost-saving, efficiency-building advantages will work for you in the equipment you build...or buy. Our engineers will gladly give you the benefit of their specialized experience in adapting Torrington Needle Bearings to your product. Call or write the nearest Torrington office or direct to:

THE TORRINGTON COMPANY

South Bend 21, Ind. Torrington, Conn.

District Offices and Distributors in Principal Cities

TORRINGTON NEEDLE BEARINGS

NEEDLE · SPHERICAL ROLLER · STRAIGHT ROLLER · TAPERED ROLLER · BALL · NEEDLE ROLLERS



A structural forging for one of Uncle Sam's newest, fastest fighting planes—made from 75-ST aluminum alloy.

This forging, 30" in length, is one of the most difficult yet produced of this new high-strength material.

Are you taking full advantage of the constantly growing range of forgings? Wyman-Gordon forgings all the way from five up to one thousand pounds.

Standard of the Industry for More Than Sixty Years

## WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - DETROIT, MICHIGAN

ONE REED & PRINCE DRIVER FITS ALL SIZES OF
REED & PRINCE RECESSED-HEAD SCREWS AND BOLTS

"A HEAD of the times"

Why waste time changing drivers?

All recessed head screws and bolts have definite advantages over the older slotted head, but the Reed & Prince type Recessed-Head is the only one which can be fitted and driven throughout the entire size range with a single driver.

#### REED & PRINCE

MANUFACTURING CO.

WORCESTER, MASS.

CHICAGO, ILL.



Manufacturers of Recessed and Slotted Wood Screws, Sheet Metal Screws, Machine Screws, Spove Bolts. Also Cap Screws, Set Screws, Machine Screw Nuts, Wing Nuts, Rivets and Burrs, Rods, Screw Drivers and Bits, Specialties.

## SYNCHRO-START

FULL AUTOMATIC STARTING AND SAFETY STOP CONTROL SETS



LOAD STARTING CONTROL











Users of industrial, marine and automotive type diesel engines all over the world know from experience the greater dependability, better and more economical performance, plus complete protection, provided by SYN-CHRO-START Automatic and Semi-Automatic Controls

The list of these users reads like a Who's Who of these fields.

Your diesel engines can be ordered with the proper SYNCHRO-START Equipment from the engine manufacturer or the Controls may be ordered direct from us.

SAFETY ALARM SETS

AUTOMATIC CRANKING CONTROLS—INDUSTRIAL



GOVERNORS

AUTOMATIC CRANKING
CONTROLS—AUTOMOTIVE



ELAPSED TIME STARTING AND STOPPING RELAYS



POWER FAILURE RELAYS



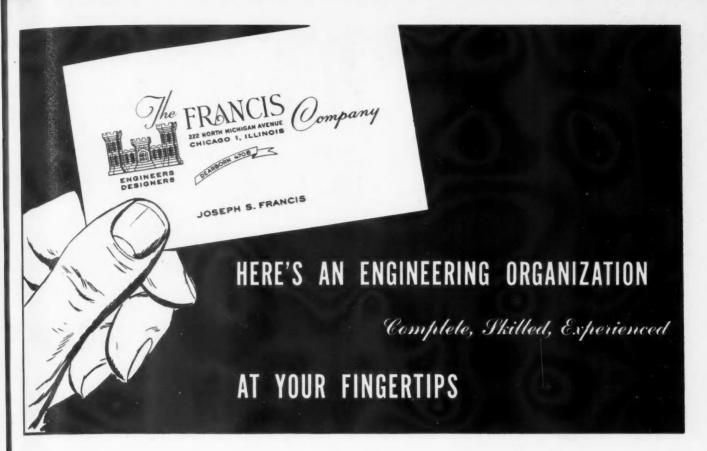
ANGLE DRIVE ATTACHMENT

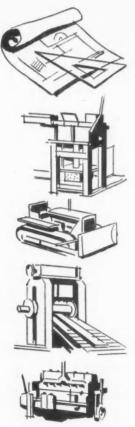




SENSITIVE VOLTAGE RELAYS

We invite your inquiry for complete information on the wide variety of SYNCHRO-START Controls, a few of which are pictured above, or our Engineering Department will gladly co-operate with you in the development of a type to meet your particular requirement.





#### WHAT IS YOUR PROBLEM?

The complete Francis Company organization is at your service to assist you in solving pressing problems of design, development and engineering . . . of products, plant and production. A broad and varied background of design experience in aviation, automotive, tractor, farm equipment and special machinery is available to help you in these ways:

- Profits through quick marketing by earlier completion of engineering.
- Additional engineering department capacity—immediately and according to your needs.
- Development of new ideas without interfering with important home department schedules.
- 4. "Workhorse" assignments—we transform your ideas into production drawings quickly and simply—new ideas go into production without disturbing regular engineering schedules.
- 5.. Product design and patent development expertly and efficiently done.
- Production machinery laid out to perform any task—you need furnish only the part and the task.
- Cost reduction design—to assure profits and control over competitive factors.

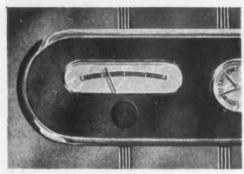
What is your problem? A representative of The Francis Company would like to talk it over with you . . . without obligation.

Design • Development • Control • Products • Production Machinery • Industrial Processes

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222 North Michigan Avenue • Chicago 1, Illinois • Telephone DEArborn 4708

# MICHO



A light that flashes through a "Lucite" lens when gas is running low. It's a little thing. But it's an idea for MICRO-STYLING that may help sell the car!



Smartly designed horn button of sparkling "Lucite" is smartly useful, too. Another distinctive feature in Micro-Styling... another sales-plus for the car!

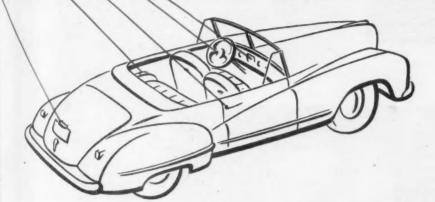


An eye-catching tail-light lens of shatterresistant "Lucite." Has long-lasting beauty and durability, excellent optical properties. A smart touch in MICRO-STYLING for sales!



Engine performance and beautiful lines are not the only sales appeals your future cars must have. An ultra-smart set of instrument-panel fixtures...a well-placed ash receiver...a streamlined horn button...a lot of little things will count! Your treatment of these big little things—your MICRO-STYLING for beauty and utility too—will be reflected in tomorrow's sales. So, when you plan that car of the future and gear it for sales—give it MICRO-STYLING!

SELL YOUR CAR TOMORROW



GIVE IT MICRO-STYLING ... GIVE IT

## LUCITE

THE TIME-TESTED PLASTIC

WHY USE "LUCITE"? Few materials can be more useful to you in MICRO-STYLING your car for eye-catching beauty and practicability too than Du Pont "Lucite" acrylic resin Look at all these special features!

cars since 1937, "Lucite" resists breaking, sunlight and bad weather. It is not damaged by gasoline, lubricants, or by many common solvents that cause crazing of some plastics. Proved for exposed lenses, hood motifs, and trim.

offers excellent opportunity for smart, practical design. Use it for dial faces, horn buttons, knobs, etc. Comes in a wide

range of color-fast hues, transparent, translucent and opaque.

BEST FOR LIGHT-REFLECTION ...



That's right! Tests show that "Lucite," because of its light-transmission and its ability to be molded accurately, is especially excel-

lent for reflectors. In transparent form, it transmits up to 92% of light. It also "edge-lights" and can "pipe" light around curves.

WRITE FOR FREE LITERATURE on "Lucite" and other Du Pont plastics. No obligation. If you wish, Du Pont technical men will be glad to consult with you in confidence and advise on applications of Du Pont plastics to help your

MICRO-STYLING plans. Address: E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Room 203, Arlington, New Jersey.



March 15, 1948

# SNYDER builds practically every kind of special-purpose metal-cutting machine

In the past 22 years we have designed and built hundreds of special-purpose machines for practically every metal-cutting operation. All of these machines have one common objective—to promote safety, to reduce handling and worker fatigue, to save time, materials, floor-space; to permit close process control through in-built, automatic accuracy; to expand markets through reduced cost. We invite your inquiries. Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

Special-Purpose machine for boring, facing and tapping valve bodies

22 Years of Successful Cooperation with Leading American Industries DESIGNERS AND
BUILDERS OF MACHINERY
FOR HIGH PRODUCTION
AT LOW UNIT COST

Double-End Connecting Rod Balancing Machine

Automaticcycle machine for rough and finish boring railroad car wheels

> Special automatic performs sixteen operations on connecting rods

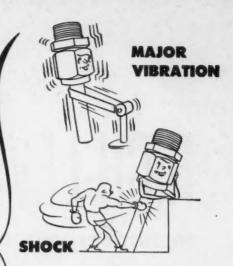
Automatic-cycle machine for drilling front truck axles

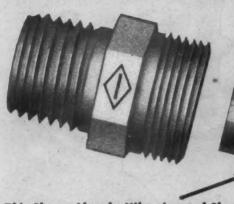
Double End Trunnion Type Machine for drilling, reaming, tapping

Center Drive, Double End Turning Machine

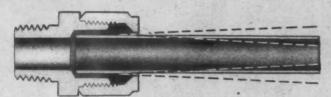
## IMPERIAL FLEX FITTINGS

for connecting tubing where there is





This Sleeve Absorbs Vibration and Shock . . . The Flex Fitting embodies a sleeve of special synthetic elastic material which permits tubing to flex back and forth through the angle shown and at the same time assures a positive, pressuretight seal.



Flex Fitting Makes Joints Virtually Indestructible by Vibration . . . On tests where ordinary fittings failed after 73,000 cycles of vibration, Imperial Flex Fittings have withstood over 20,000,000 cycles without failure as indicated in the chart below:

For All Kinds of Tubing . . . Imperial Flex Fittings can be used with all types of seamed and seamless metal tubing, including copper, aluminum, thin-wall steel, monel, stainless steel, etc.

TUBE

MOVEMENT

Easy to Install . . . All that is necessary is to slip nut and Flex sleeve over tubing. Then insert tubing into fitting body as far as it will go, and assemble. On sizes larger than 1/2" O.D. and where higher pressures are involved, end of tubing should be belled slightly.

Proved by Extensive Use in the Field ... Used as standard equipment on trucks, tractors, diesel engines, oil filter connections, heavy power equipment, machinery, etc.

#### **COMPARATIVE VIBRATION TEST**

NUMBER OF VIBRATIONS IN CYCLES	20,000,000
Flare Fitting failed after 72,450 cycles	
Compression Fitting failed after 79,350 cycles	
Hi-Duty Fitting failed after 401,72	25 cycles
FLEX FITTING showed no signs of failure after	21,424,500 cycles

gives complete engineer-ing data on Flex Fittings including types, sizes, dimensions, specifications and applications. Write for your copy.

CATALOG No. 344-B

THE IMPERIAL BRASS MFG. CO., 1241 W. Harrison St., Chicago 7, III.

PIONEERS IN TUBE FITTINGS AND TUBE WORKING TOOLS

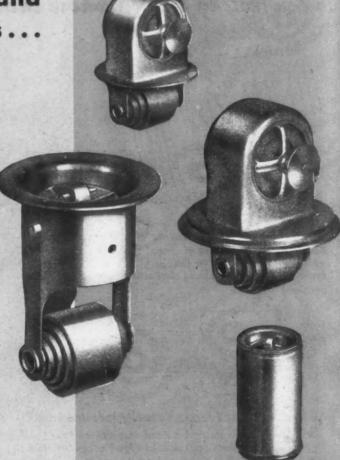


## HIGH-LEVEL PERFORMANCE

in tomorrow's cars and commercial vehicles...

New performance levels will be achieved in part by effective regulation of motor temperature.

Such control—maintained by a DOLE Thermostat in the cooling system—will contribute to smoother functioning all year round—with quicker warm-up and positive savings in motor wear, gas and oil, and reduction of crank case dilution.



DOLE.

THERMOSTATS

in a wide range of types for all types of vehicles

THE DOLE VALVE COMPANY, 1901-1941 Carroll Ave., Chicago 12, Illinois LOS ANGELES DETROIT PHILADELPHIA

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a typical example of how

THE FORMETAL / ()\* means lower costs to you



## FORMETAL

Superformed

BUSHINGS AND BEARINGS The \*Improved Quality of Formetal "Superformed" Bushings and Bearings gives you better performance at real dollar savings.

For example, an automotive parts manufacturer replaced the ordinary bushings he was using with Formetal Bushings made to his specifications. Now he not only secures better performance, but his savings on bushing costs alone are over \$16,800 annually.

The exclusive method by which Formetal Superformed Bushings and Bearings are manufactured gives them qualities that ordinary bushings do not have. They can provide a higher Rockwell hardness without loss of machinability. A thinner wall often will give the same strength as the heavy wall of an ordinary bushing. Custom-made oil grooves, to provide the proper wiping action of the oil film can be engineered to your exact need.

Made of bronze, steel, or an alloy to your specification, FORMETAL bushings or bearings save you money. It costs nothing to obtain the data that applies to your product. Write for details and a copy of free reference booklet of BUSHINGS, BEARINGS AND SPACER TUBES...you will find it extremely informative.

NATIONAL FORMETAL CO. Inc., 6610 Metta Ave., Cleveland 14, Ohio Please send free copy of your reference catalog.





#### NATIONAL FORMETAL CO., INC.

ESTABLISHED 1919

Manufacturers of "Superformed" Bushings and Bearings...and Spacer Tuber

6610 Metta Ave., Cleveland 14, Ohio Offices in Detroit . Providence . Denver . Kansas City, Mo. . Chicago . Los Angeles . New York. cham

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## WAUKESHA Viesel ENGINES

Thermostats assist quick warm-up and maintain jacket heat.

Glow plug for electric starting.

American Bosch single hole, pintle nozzle.

Waukesha clean-burning water-cooled combustion chamber removes from the outside.

High heat concentrates at insulated chamber outlet; accelerates ignition, promotes clean burning and high economy.

One straight side oil control piston ring.

Built-in oil cooler increases oil and engine life.

Full length water jackets increase cylinder life.

Large, rifle-drilled, main oil header.

High capacity outsidemounted oil pump.

Hardened main and connecting rod crankshaft journals. Steel backed, copper-leadbabbitt precision bearings pressure oiled.

Alloy-steel heat-treated main bearing studs.

M

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RIES

Pressure oiled rocker arms.

Twin valve springs and hardened guides.

Controlled turbulence chamber insures clean, complete, combustion.

Hardened alloy exhaust and intake valve seats.

Cooling oil at piston crown circulates under intermittent pressure.

Four non-stick, wedge-type piston rings.

Tubular push rods.

Cooling oil passage to piston crown.

Hardened, removable cylinder sleeves test 400-450 Brinell.

Cooling oil discharge from piston crown.

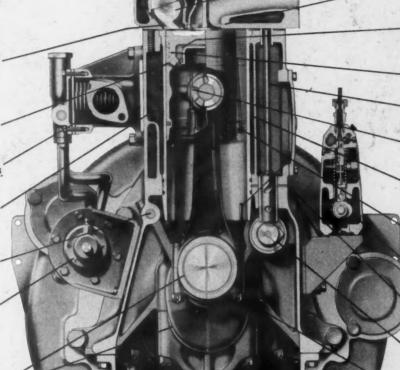
American Bosch injection pump.

Tell-tale drip passage

Hardened camshaft, single forging.

Four alloy-steel heattreated rod bolts.

Oil level equalizer and intake strainer.



Salient features of Waukesha Model 6-WAKD Waukesha Diesel Engine

WAUKESHA MOTOR COMPANY · WAUKESHA, WIS.

Eastern Sales Office: Eight W. 40th St., New York 18, N. Y. Mid-Continent Office: 703 S. Wheeling St., Tulsa 4, Okla. Pacific Coast Office: 4297 Pacific Blvd., Los Angeles 11, Calif.

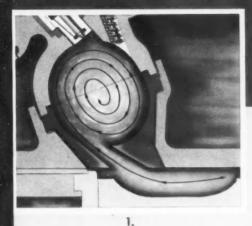
SEE OTHER SIDE FOR COMBUSTION SEQUENCE





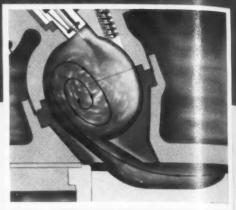


## WAUKESHA DIESEL COMBUSTION SEQUENCE



Compression nears peak.
Alt, heated by pressure and plawing-combustion charaber throat, rotates in contrailed turisdance.

2 — Fuel enters and is swept from nozzle into air stream; burning starts.



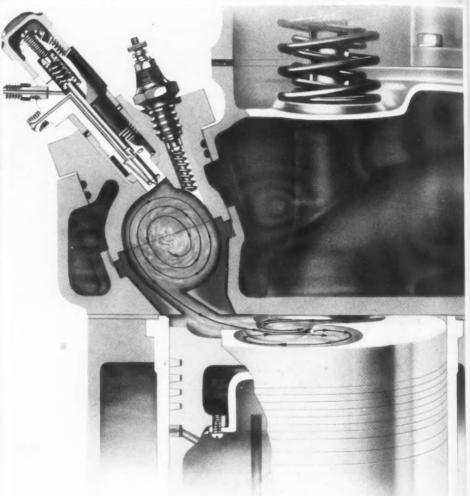
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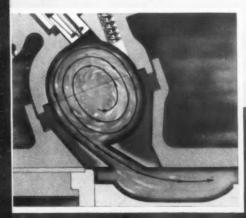
3.

 Charge in chamber burning fully; turbulence insures efficient mixing of fuel with air.

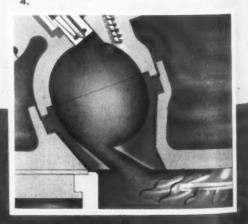
> 4—Injection ends; turbulent burning gases spread into swirl chambers in piston crown. Full power developed.



5 — Expanding gases deliver power smoothly as piston descends.



6 — Power stroke nearly completer exhaust valve opens at opinium point. Heated combowing up will warm incoming air



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# NICKEL STEELS PREFERRED FOR HIGH TORQUE STRENGTH-



These universal joints of nickel-chromium steels are designed to withstand terrific shock loading and vibration.

They were made by Cleveland Steel Products Corporation, producer of drive lines for the major proportion of Dodge trucks, and for many Studebaker, Reo, Mack, Twin Coach and other commercial vehicles.

Experience with substitute materials during wartime strengthened this producer's preference for nickel alloy steels.

Today, the Cardon cross is made from Type 3120 steel drop forgings, carburized and hardened to 60

Rockwell C on the surface for maximum wear along with a core hardness of 30 to 35 Rc.

Spline shafts are forged from Type 3135 steel, heat treated to 45-49 Rc. This part also withstands high torque, as well as friction caused by the sliding yoke.

Cap screws are Type 2330 steel, containing 3½ percent nickel, treated to 240 to 250 Brinell hardness.

Experience shows that nickel alloyed steels provide not only the desired performance, but readily respond to heat treatment and fabrication.



Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses and bronzes and other alloys containing Nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

## Again, Again and Again...



Bosly Grinders

Make Production

Savings on a Wide

Variety of Jobs

BESLY



The Besty No. 953-36" Vertical Spindle Wet Grinder, with changes in fixtures, faces 100 to 200 Mower Sections and Guard Plates per minute. Bevels the same pieces at the rate of 72 to 150 per minute.

The ability of Besly Grinders to make production savings is exemplified in this No. 953-36" Besly Vertical Spindle Grinder tooled for grinding various sizes and shapes of round and rectangular Alnico magnets on opposed surfaces. Production: 500 to 1200 pieces per hour with one operator; up to 2000 pieces per hour with two operators. Work is held to limits of plus or minus .001 inch for size, .002 inches for parallelism.





Helpful Facts on Abrasive Wheels

Write for this free booklet...It contains valuable information on grinding wheels and abrasives. Get the facts about Besly Titan Steelbacs—they save "down time" and steep up production.



Adapted to your work, the "953" or other Besly Grinders may answer your production problem. Why not talk over your specifications and needs with a Besly engineer.

BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS . BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY . 118-124 N. Clinton St., Chicago 6. III. . Factory: Beloit. Wis.

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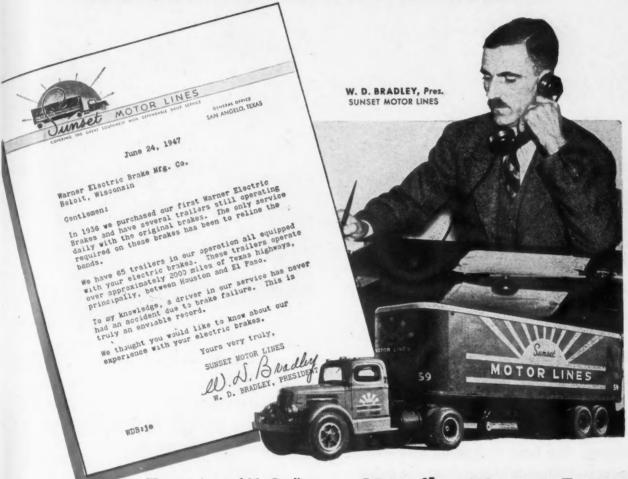
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# USER REPORT

.."a driver in our service has never had an accident due to brake failure."



The experience of Mr. Bradley and the Sunset Motor Lines, during 11 years of every-day use of Warner Electric Brakes on their tractor-trailer fleet, is typical of the kind of service you, too, can expect when your trailers are equipped with Warner Electric Brakes.

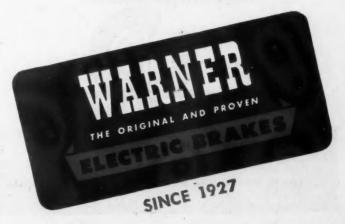
They provide an entirely new concept of effective stopping power. Being electrically operated there is no time lag in getting instantaneous action regardless of the distance between cab and rear trailer wheels. They develop their stopping power within the brake itself. Always controlled braking power — driver sets "Vari-load" dial on dash to meet load and road conditions.

For maximum performance and satisfaction, standardize on WARNER ELECTRIC BRAKES. Write for illustrated literature, explaining all their many advantages.

WARNER ELECTRIC BRAKE MFG. CO.

BELOIT. WISCONSIN

..65 trailersWARNER EQUIPPED never in an accident due to Brake Failure



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Cooperation with automotive engineers in solving problems of piston design and performance has long been a recognized, valued service of Permite Engineers.

Many of the most efficient piston types in use today incorporate features developed by Permite research, Permite engineering and testing. We have worked in close, continuous collaboration with automotive industry engineers ever since the first successful use of aluminum pistons.

You will find the Permite organization with its vast foundry capacity, modern metallurgical laboratory and complete quality-control equipment, a reliable source of supply for pistons made to your specifications.

If on the other hand you have some special design problem which has not been worked out to your complete satisfaction, you may find it very helpful to talk the whole matter over with a Permite Engineer. Our quarter-century of experienced know-how is at your service always.



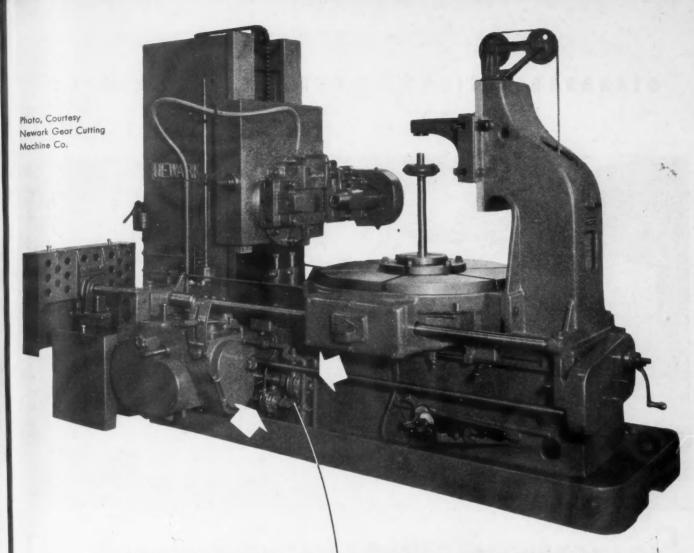
### ALUMINUM INDUSTRIES, INC.

CINCINNATI 25, OHIO

SCHROLT: 809 Mere Centur Building, HEW YORK: 9 Rethafeller Plaze. CHICAGO: 44 E. Jockson Boulevard. AllANTA: 413 Grant Building

ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS

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### REVERSING DRIVE SHAFTS

CAN'T STUMP THE TUTHILL MODEL R PUMP



pump—a pump that follows directions and delivers from the same port regardless of the direction in which it is driven.

The Tuthill Model R Automatic Reversing Pump solves the problem of driving the pump from a reversing shaft without the use of check valves and without changing the direction of flow of the pumpage. Model R is a positive displacement internal-gear rotary pump that is ideal for lubrication, coolant and liquid transfer service. Capacities from 1 to 200 g.p.m. and pressures up to 100 p.s.i. Also available in stripped form for direct incorporation into the design of the machine.

Here is the one truly automatic reversing

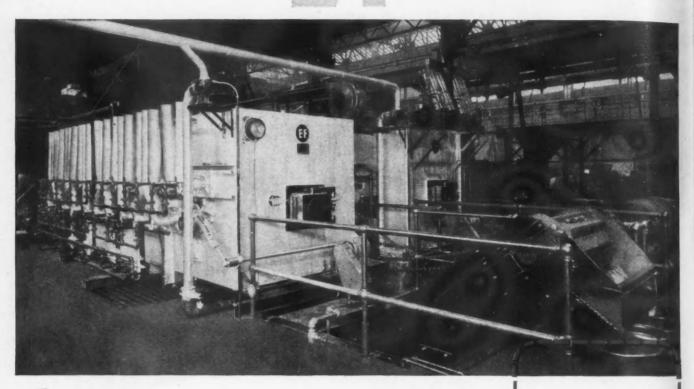
Write for Tuthill Reversing Pump bulletin.

TUTHILL PUMPS

TUTHILL PUMP COMPANY . 939 EAST 95TH STREET, CHICAGO 19, ILLINOIS

IES

### STANDARD DESIGNS OF CHAIN BELT FURNACES



### FOR THE LOW COST HEAT TREATMENT OF SMALL AND MEDIUM SIZE PARTS

• EF Chain Belt Furnaces, see view above, are the most satisfactory continuous heat treating equipment yet devised for carbon restoration, scale free hardening and hardening without decarburization of small and medium size parts. The material is loaded directly onto the EF continuous heat resisting cast link conveyor belt—and is conveyed automatically into the furnace—treated uniformly in the special controlled atmosphere produced in an EF generator,—discharged through a sealed chute into continuous quenching equipment—and either carried on through washing equipment and draw furnace—or passed directly into tote boxes as desired. These furnaces are built in standard sizes, for capacities up to 2000 lbs. per hour. Special designs to meet any requirement. Estimates of equipment, installation, and operating costs—and samples of treated parts—furnished promptly. Write for descriptive catalog.

Chains Rivets
Gears Screws
Engine Parts

**Pinions** 

**Bolts** 

Bearing Parts

Tools

**Tractor Treads** 

...and a wide variety of other forged, drawn, stamped, machined, headed and welded parts



THE ELECTRIC

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION Salem-Chio

GILLS EN E

for better trucking



FRONT AND DUAL REAR IN 20", 22", AND 24" SIZES TO FIT MANY POPULAR TYPES OF TRUCK AXLES

GUNITE Cast Wheels — both Truck Fronts and Truck Dual Rears — are made with many distinctive design features for greater strength, safety, and durability. These include deep-spoke structure that provides practically straight-line stress transfer from rim to outer bearing; extra-wide, non-slip lugs on floating rim bolts; and ventilated spacer (on rears). Gunites are made of strong, controlled-quality cast steel (except for 20" fronts, which are malleable iron). Accurate machining assures proper fit on standard axles. Famous Gunite Brake Drums are integral parts of these cast wheel assemblies. Buy GUNITES — for better trucking!

GUNITE FOUNDRIES
ROCKFORD, ILLINOIS



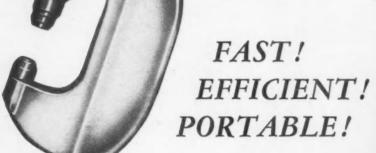
GUNITE WHEELS ARE CAST AND FINISHED IN GUNITE'S OWN FOUNDRIES AND MACHINE SHOPS

HANNIFIN

"hy-power"

UNITS FOR

Hannifin's exclusive "Hy. Power" Hydraulic Pressure Generator. Ask for a copy of Bulletin No. 53.W



For prompt, dependable help in getting tooled up for efficient production, use Hannifin "Hy-Power" Hydraulic Units.

**COMPLETE LINE**—Portable and stationary types. Standard and special designs available for riveting, pressing, punching, piercing, crimping. Dies for every purpose. Capacities to 100 tons; reach to 6' or more.

FAST—Time cycle for standard riveters ranges from 1½ seconds to 3 seconds for 3" or 4" stroke units.

**EFFICIENT**—More work with less effort, no noise. Easy to maintain almost unbelievably high production rates. Low power costs. Every operating convenience.

PUSH BUTTON CONTROL—A single push button\* gives you complete control. Hold button down and riveter goes through one complete cycle automatically: rapid advance stroke at low pressure... short power stroke at full pressure... auto-

matic return to starting position. To repeat cycle, release and again depress button. For instant safety at any point, release button and ram retracts.

\*Foot control also available.





PUSH BUTTON CONTROL

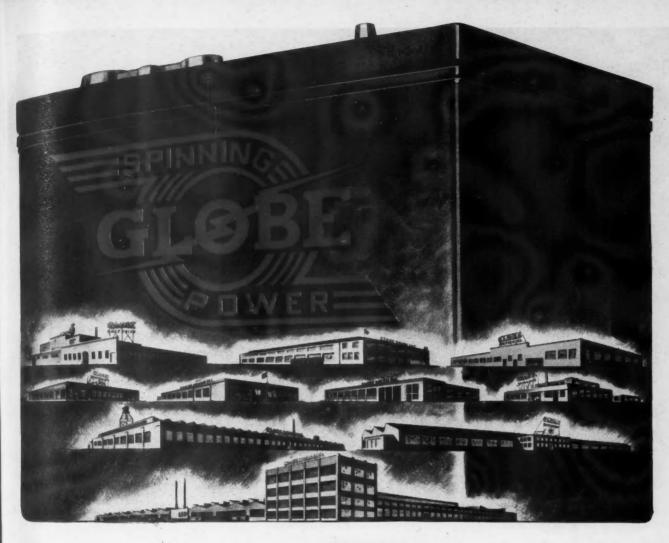
### HANNIFIN CORPORATION

1101 S. Kilbourn Ave. HANNIFIN Chicago 24, Illinois

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES

PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

Nationwide Sales and Service



ONE SMALL FACTORY IN 191



TEN GREAT PLANTS IN 1948

## THE STORAGE BATTERY GREW UP WITH GLOBE-UNION

Since the days of the "horseless carriage" the name "Globe-Union" has meant quick starting and dependable electric power for automotive vehicles. Just as the horseless carriage owes its development to the great names which are to-

day's leaders in automobile production, so the storage battery, staunch ally of automotive power, has grown up with the great names of battery building. Globe-Union is very proud of its part in storage battery development. Many of the milestones in battery history were also milestones in the progress of Globe-Union . . . the inevitable consequence of the Globe-Union pioneering and research which has helped produce the remarkably efficient storage battery of today.



### GLOBE-UNION INC.

MILWAUKEE . BOSTON . PHILADELPHIA . CINCINNATI . DALLAS . ATLANTA . MEMPHIS
MINERAL RIDGE, O. . OREGON CITY . LOS ANGELES

### THINGS YOU CAN

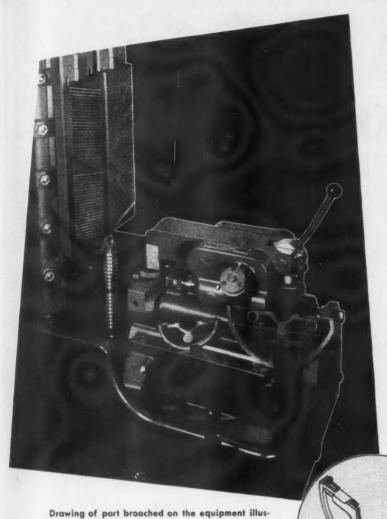
# Depend On

When you greet tomorrow's sun, it's good to know that there are other things equally dependable to help you in your task of creating America's automobiles. You can depend on Stewart-Warner to produce quality engineered products—lubrication systems, instruments, car heaters—to the most exacting standards of precision. And you can depend on Stewart-Warner to give you the kind of fast service that makes the impossible seem commonplace.

Depend On stewart-warner corporation

Serving the Automotive Industry for 40 Years

3-140 General Motors Bldg., Detroit 2, Mich., 1800 Diversey Pky., Chicago 14, Ill.

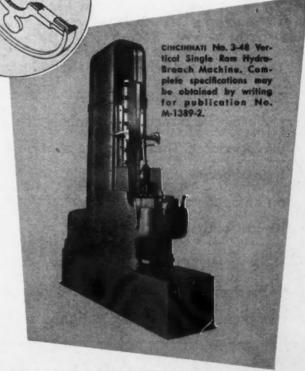


# 90 SIZES OF CAMS

# ... BROACHED ON THIS CINCINNATI EQUIPMENT

Close-up of the tooling designed by CMMCO broach engineers to broach 90 different cams. The largest and smallest parts are leaning against the fixture. One machine, a CINCINNATI No. 5-54 Vertical Single Ram Hydro-Broach, and one fixture with interchangeable details, handle all these parts.

Whenever you find similarity of machining operations in your shop, it's time to consider the cost-saving possibilities of broaching. How one manufacturer cashed in on this family trait is illustrated here. The machine is a CINCINNATI No. 5-54 Vertical Single Ram Hydro-Broach, equipped by Cincinnati Application Engineers to broach 90 sizes and shapes of cams. Size and shape of the curved section of the parts vary widely, but they are all of the same thickness and half-bore, and the parting face varies in width only. They constitute an ideal group of parts for the application of broaching to the half-bore and parting face. One fixture, with interchangeable details, accommodates the entire group of 90 cams. Icin-CINNATI Hydro-Broach Machines broach all manner of parts, from band saw blades to automobile cylinder blocks; small lot family groups of parts to millions of identical parts. Our broach engineers are at your service. Write for methods analysis and production estimates, and include blueprints and full particulars with the letter.





### THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U.S.A.

MILLING MACHINES . CUTTER SHARPENING MACHINES . BROACHING MACHINES

# CUSHION SEATS



MILSCO Commander Type . . . a seat with a soft cushion over coil springs and a flexible backrest that synchronizes the movement of the operator with the mation of the machine.



MILSCO Bucket Type with backrest . . . all MILSCO bucket type seats (with Ventilation - Drain feature) can be equipped with a padded backrest.



## Designed to fit your equipment

The operator's performance rises with seat comfort, falls with seat-fag... and his performance directly affects the machine's performance. That's why the seat on any type of heavy-duty mobile equipment takes on an importance far out of proportion to its cost and size.

Here at MILSCO are men who know and understand seat problems . . . men who can produce a specially designed seat to

fit your job and cost requirements.

The typical MILSCO seats illustrated above are standard models, extensively used on a variety of heavy-duty mobile equipment ranging from tractors to power shovels, draglines, etc.

For specific information, consult with MILSCO for seats designed for more operator comfort . . . increased operator production.

### MILSCO MANUFACTURING CO.

2758-T North 33rd Street

MILWAUKEE 10, WISCONSIN



welded presses, still sets the standard toward which others build.

Today, Verson is utilizing its long experience in building better presses to lead in the development of fully automatic mass production equipment. Many products heretofore produced on several separate presses are now being made on a single, automatic Verson machine, thereby making possible greater production at lower unit cost.

Whatever your press problems, it will pay you to investigate what Verson can do for you.

VERSON ALLSTEEL PRESS CO 9307 So. Kenwood Ave., Chicago, 19, Illinois

There is a Verson Press

for every job ... from 60 tons up!



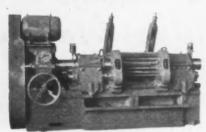


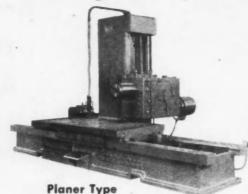


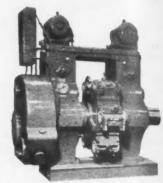
### PRECISION PRODUCTION MACHINERY



### Milling Machines









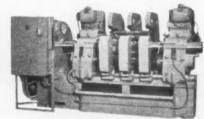
### Drilling Machines



Special Machines



Boring



Mill & Center



Mill, Drill & Tap

Multiple spindles are coupled with continuous operation to obtain the maximum in production. Illustrations show representative types of developments made, but, many more are available for a wide range of applications.

Our General Catalog A-90 is available or recommendations can be made promptly on direct inquiry.

### OMPSON COMPANY DAVIS and

MANUFACTURERS OF Machine Tools

### NATIONAL OIL SEAL LOGBOOK

# CORRECT SHAFT SURFACES ARE ESSENTIAL FOR OPTIMUM OIL SEALING

Oil seals perform best and last longest on shafts of maximum hardness and smoothest finishing. Seal performance depends on these two factors, when other conditions such as speed and temperature are equal.

In many production applications, however, optimum hardness and smoothness may be impractical. Also, on many slow-speed, wide-tolerance mechanisms, a polished shaft may not be necessary or desirable.

### Suggested R.M.S. Finishes

Tests conducted over many years' time have shown R.M.S. finishes of between 15 to 25 to be a practical compromise for most industrial applications. Such a finish can generally be obtained by production methods, without prohibitive cost. During tests, seals on shafts of this finish have operated continuously up to 12,000 hours at high speed, without evidence of serious leakage.

More finely finished shafts, of course, permit still greater seal performance. On test shafts polished to 5 R.M.S., National Oil Seals have been continuously operated at 4000 RPM for several years—many times the life expectancy of any mechanical equipment. On shafts finished only to 150 R.M.S., operating at 4000 RPM, similar seals may have a life expectancy of as little as a few months, or even weeks.

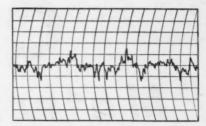
### Hardness vs. Abrasion

Under ideal conditions, where shaft speeds are slow, where oil is properly filtered and dust is excluded, seals will operate almost indefinitely on shafts of cold rolled steel.

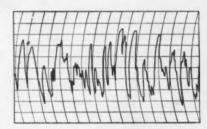
In the majority of cases, however, some abrasive material is turned into the sealing area. Shafts therefore should be of a hardness (at least locally) compatible with severity of the abrasion present. Under severe conditions of abrasion, both seal and bearing area should be hardened locally. A typical application in which such conditions are found is the front end of automotive crank shafts. Another is the driving mechanism of heavy earth-moving, agricultural or construction equipment.

### **Auxiliary Seals**

Hardened shafts are also desirable when auxiliary sealing members are employed to protect main sealing members. Materials used in auxiliary sealing members are generally felt, leather, cork or unlubricated synthetic rubber compounds. All of these, when used as auxiliary seals, tend to wear shafts more severely than when used as a lubricated main sealing member.



This chart shows surface variation of a piece of metal with 16 RMS finish, with the attenuator set at .01 micro inches.



This chart shows surface variation of a piece of metal with 63 RMS finish, with the attenuator set at .01 micro inches.

Even in such cases, however, shaft hardness should be governed by surrounding abrasive conditions, rather than type of auxiliary seal employed.

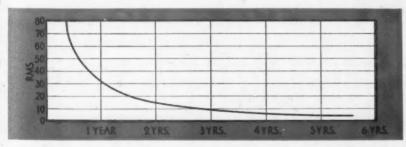
More specific suggestions appropriate to your sealing problem will be gladly offered by National Oil Seal Engineers, located in most major cities. When inquiring, please give fullest details so that National Engineers may be most helbful.

All information will be held in strictest confidence.



### NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California Plants: Redwood City and Los Angeles, California: Van Wert, Ohio



### CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

BUFFALO: 56 Arlington Place, Grant 2280. CHICAGO: Room 2014 Field Building, Central 8663.

CLEVELAND: 210 Heights Rockefeller Building, Yellowstone 2720. DALLAS: 301/2 Highland Park Village, Justin 8-8453.

DETROIT: Room 1026 Fisher Building, Trinity 1-6363. HOUSTON: 6731 Harrisburg Boulevard, Wayside 2621.

LOS ANGELES: 2244 East 37th Street, Kimball 6384. MILWAUKEE: 1717 E. Kane Place, Lakeside 2838.

NEW YORK CITY: 122 East 42nd Street, Lexington 2-8260. PHILADEPHIA: 401 North Broad Street, Bell-Walnut 2-6997.

REDWOOD CITY, CALIF.: Broadway and National, Emerson 6-3861. SPRINGFIELD 3, MASSACHUSETTS: 124 State Street, Springfield 2-1881.

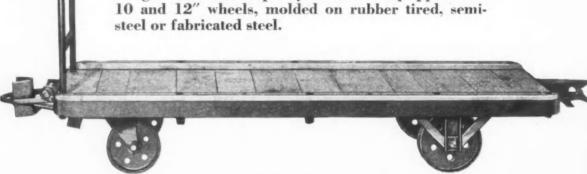
WICHITA: 340 North St. Francis Street, Wichita 2-6971.

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# CLARK Materials Handling EQUIPMENT

Clark Standard No. 515 Industrial Trailer Truck with No. 514 Automatic Coupler

SIZE 36 x 72" May be had in varied capacities and designs. Standard Capacity 4000 lbs. Equipped with 10 and 12" wheels, molded on rubber tired, semisteel or fabricated steel.



Shown with breakproof fabricated steel wheels and breakproof fabricated steel casters.



No. 514 Automatic coupler

No. 515 trailer truck may be equipped with other types coupler and hitches if desired.

CONSTRUCTION OF CLARK FABRICATED MATERIAL HANDLING EQUIPMENT CANNOT BE SURPASSED FOR DURABILITY AND SERVICE.

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by

### ALL STEEL WELDED TRUCK COMPANY

1149 Railroad Ave.,

Rockford, Illinois

Builders of all types materials handling equipment (manually operated) CLARK CLUTCH molded plywood boats, adjustable boat trailers, winches, STAINLESS STEEL TANKS AND TANK TRUCKS.

B-W PRODUCTION

# TODAY







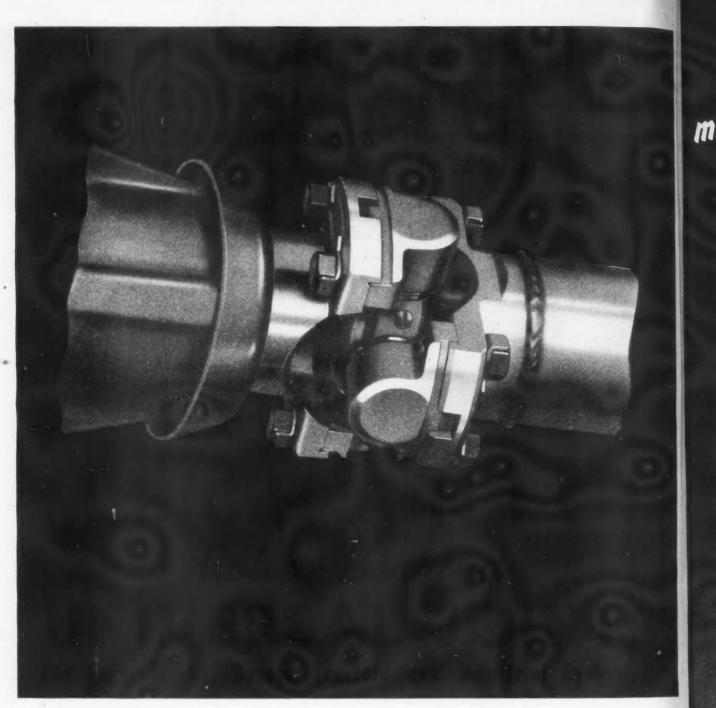




The Automotive Industry
looks to
BORG-WARNER

FOR ENGINEERING...PRODUCTION

THESE UNITS FORM BORG-WARNER, Executive Offices, Chicago: BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING • CO., LTD. • MARBON • MARVEL-SCHEBLER CARBURETOR • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN • MORSE CHAIN • MORSE CHAIN • MORGE • NORGE • NORGE • NORGE MACHINE PRODUCTS • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • SUPERIOR SHEET STEEL DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD. • WISCONSIN TRANSMISSION





The use of MECHANICS Roller Bearing UNIVERSAL JOINTS avoids carrying unnecessary weight — by eliminating companion flanges and bolted connections — without any loss of torque capacity. The center line of MECHANICS bearing assemblies is closer to the bearings in the transmission assembly and pinion shaft, thus cutting down long over-hang, and assuring smoother running. Whip and runout are reduced to a minimum by careful balancing and testing of MECHANICS Roller Bearing UNIVERSAL JOINTS and SHAFTS at top speed.



### MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner . 2024 Harrison Ave., Rockford, III.

Engineered by Borg & Beck
means...MAXIMUM clutch DEPENDABILITY
for that vital spot where power
takes hold of the load!





BORG & BECK DIVISION

Borg-Warner Corporation CHICAGO, ILLINOIS







- QUICK SMOOTH PICK-UP
  - QUIETER OPERATION
    - MORE RESISTANCE TO WEAR

Simply specify Ingersoll Clutch Discs. Then you will be sure of all "four" because these discs are made from specially-tempered cross-rolled TEM-CROSS Steel.

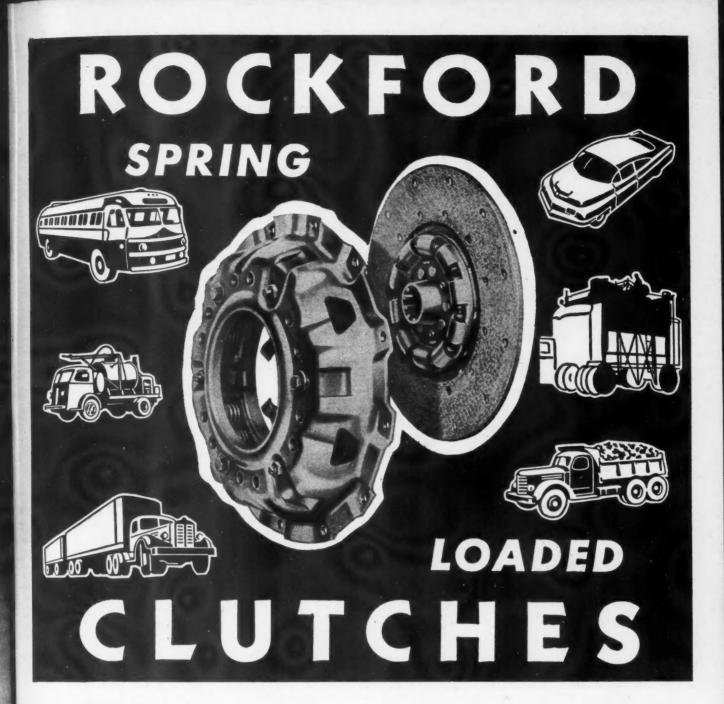
\*Specify

INGERSOLL Steel Division • BORG-WARNER Corporation
New Castle, Indiana

Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan

CLUTCH DISCS





LIGHT PEDAL PRESSURE

CUSHIONED ENGAGEMENT

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ACCURATE BALANCE

DIRT EXCLUSION

HEAT DISSIPATION

LIFETIME ADJUSTMENT

Rockford Clutches are used as original equipment in millions of cars, trucks, tractors and busses. Unique construction features, highest quality materials and superior workmanship assure long, satisfactory operation — with minimum servicing requirements. Rockford produces both Spring-Loaded and Over-Center types of clutches for all automotive, agricultural and industrial equipment — light and heavy duty. Let our engineers show you how Rockford Clutch features will help give your products competetive advantages.

### Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER-TAKE-OFFS. Contains dia-





grams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
A 1311 Eighteenth Avenue, Rockford, Illinois, U.S.A. A

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QUIET... SMOOTH... DEPENDABLE DURABLE...



bast 34 years, 114 makes of passenger d truck engines have been equipped with more than 41,000,000 Morse timing chains for driving camshafts and accessories.

Consult our engineers MORSE CHAIN COMPANY-Detroit 8, Mich.

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# THE HIGHWAY BUS CAN'T AFFORD A"FEVER"



LONG RADIATORS KEEP 'EM COOL!



Highway buses carry heavy loads at high speeds for long distances—and they do it night and day. Engines demand efficient heat exchange from the radiator.

The Flxible Company, of Loudonville, Ohio, uses Long radiators in this vital function. Our fin-and-tube design and careful construction provide smooth water courses and minimum resistance to air flow. Since 1903, millions of cars, trucks, buses and tractors have been equipped with Long radiators.

LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
Detroit 12, and Windsor, Ontario



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**CLUTCHES • RADIATORS • OIL COOLERS** 



No constant repair, less replacement of parts, no finicky service troubles
with the Marvel-Schebler carbureter. It performs with top-notch reliability year after
year, mile after mile, because it's built tough and strong... for precision performance. For
example, the bowl is a rugged zinc die-casting—and it's tightly sealed so that no dirt
or grit can enter to impair efficiency. Other Marvel-Schebler features include the
Automatic Economizer that precisely regulates fuel consumption • Accelerating Pump • Fuel Trap
in bowl bottom to prevent engine "cut out" when rounding curves • Triple Venturi for
better combustion and smoother acceleration • Two Hole Idle System that acts as a
fuel economizer and power booster • Air cooling and minimum internal channeling to
prevent percolation.

Your fleet will roll more smoothly, dependably, and economically with Marvel-Schebler carbureters. For complete particulars write MARVEL-SCHEBLER CARBURETER DIV., BORG-WARNER CORP., FLINT, MICHIGAN.

**MARVEL-SCHEBLER CARBURETERS** 

# WARNER AUTOMOTIVE PARTS

for 35 years

a dependable and
experienced source
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AXLE SHAFTS • TRANSMISSION GEARS
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MACHINE TOOL GEARS . POWER TAKEOFFS



WARNER AUTOMOTIVE PARTS

Division of BORG-WARNER CORP., Auburn, Ind., Detroit, Mich.





# TOMORROW !











The Automotive Industry
can count on

BORG-WARNER

FOR ENGINEERING...PRODUCTION

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# Good STEERING DOESN'T JUST Happen











Jood steering consists of more than a steering gear.

Many other factors must be correlated to achieve top steering performance. Front-end geometry, to be correct, requires the combined talents of many specialists.

- Here at Ross we work closely with our customers in all phases of steering development.
- This working association starts with the selection of units (based on tentative specifications) and continues through board-layouts, experimental testing, assembly line installation, and field-service investigation.
- Passenger cars, trucks, buses, tractors, boats and many special types of vehicles have the advantages arising from this comprehensive and continuing Ross service.
- We would be pleased to work with you on your steering problems.

Cam & Lever STEERING

ROSS GEAR AND TOOL COMPANY . LAFAYETTE, INDIANA

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with BARNESDRIL

BARNESDRIL HYDRAULIC PRODUCTION UNITS are self-contained, hydraulically operated machines for specialized high production drilling, reaming, tapping, facing, boring, threading and other operations. Specifically designed to meet particular production problems, their flexibility provides easy conversion from one set-up to another, offering fast, low-cost methods of machining. As shown, these units may be arranged singly, or in combinations of vertical, horizontal or angular groups, mounted on suitable columns or beds, or grouped around a rotating index table or drum. Interchangeable single spindles or multi-spindle heads are easily mounted on flange supports, increasing adaptability of units to different jobs. A wide variety of multiple surfaces may be machined simultaneously, or a series of operations in sequence. Write for complete data on specifications, applications and extra equipment. Ask for Bulletin B150.

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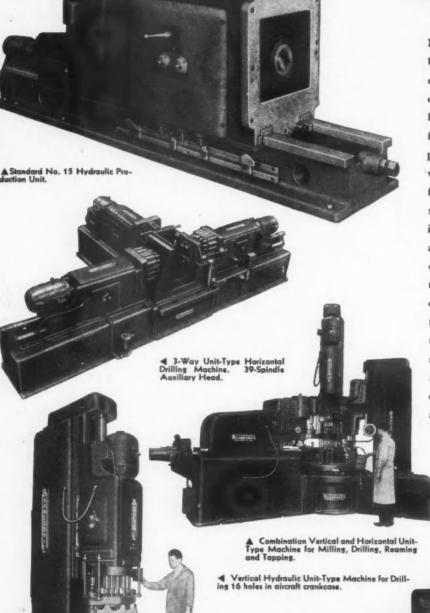
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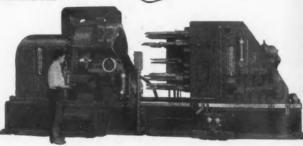
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Horizontal Drum-Type Ma-chine for Drilling and Taper





ARNES

850 CHESTNUT STREET ROCKFORD, ILLINOIS

6

PRODUCTION EQUIPMENT

BARNESDRIL Magnetic-Automatic COOLANT SEPARATORS remove metal and abrasive particles automatically from soluble and oil coolants. Built in sizes ranging from 5 to 350 gallons capacity per minute, these separators constantly recondition coolant for recycling in the machine. Applied to any honing machine or internal, surface and cylindrical grinders, they have low initial and maintenance costs — no filters used. Send for Bulletin B151 for complete information.

BARNESDRIL Vertical and Horizontal Hydraulic HONING MA-CHINES are built in a range of sizes for finishing internal and external cylindrical surfaces. Bores up to 40" diameter can be handled, or strokes as long as 90 feet. Features include semi- or fullyautomatic cycle, controlled hone expansion, adjustable stroke stops, and controls arranged for maximum operator convenience. Write for Bulletin B121 covering Honing Machines and the Honing Process.

**BARNESDRIL** Production DRILLING AND TAPPING MACHINES feature high speed production with maximum ease and convenience of set-up, including dial selection of depth, feed and speed. Multiple speeds and feeds are provided for general purpose drilling, or multiple spindles and special tooling may be ordered, for production drilling. Catalog B201 sent on request.

BARNESDRIL SELF-CONTAINED PRODUCTION UNITS offer increased flexibility for volume production. Engineered for cycle operation, they are adapted to angular, vertical or horizontal operation, singly or in groups. These 2 horsepower capacity units are self-contained, providing rapid air approach and return, and hydraulic feed. Ask for Bulletin B200.

No. 2 Self-Contained Production Unit

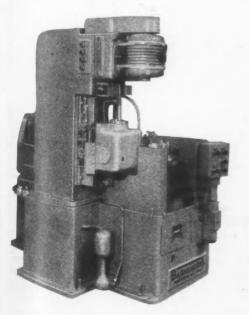
—Air Traverse, Hydraulic Feed. 

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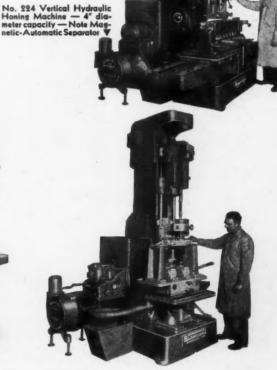
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No. 221¾ Drilling and Tapping Machine
— Dial Selected Depth, Feed and Speed.▼







307 Vertical Hydraulic Honing :hine — 6½" diameter capacity—

BARNES DRILL CO.

850 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

### How to Get Better Milling Methods with SUNDSTRAND

## "Engineered Production"

Better milling production can be obtained only by lowering unit production costs ... obtaining the most economical solution to your milling problem and the most productive equipment in relation to your production requirements.

Basically, there are two approaches to solving these problems: (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method, — standard or semi-standard machines, if possible, or entirely special machines, if necessary.

This latter method is Sundstrand "Engineered Production"... a most practical approach to economical milling. Here's how it has been applied in three different plants on three different milling problems.

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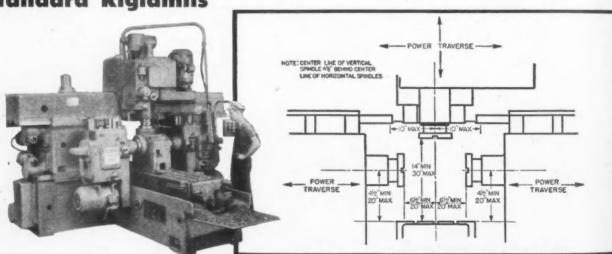
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1 · Standard Rigidmils





### More Data FREE

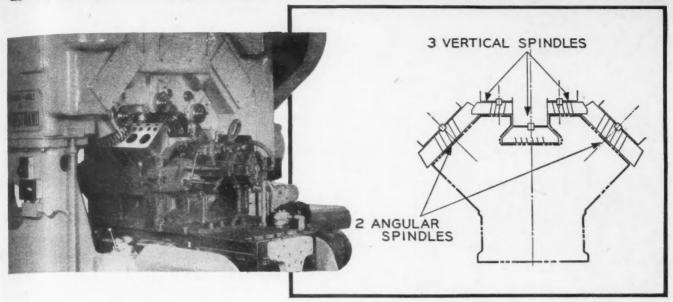
This new 40 page booklet reveals how mass production milling problems can be solved most economically by one or a combination of only 3 different methods. Write for your copy today. Ask for bulletin No. 268.

Here's a standard Sundstrand Triplex Rigidmil with design features which add flexibility to production milling of either wide or narrow parts without sacrifice in accuracy. In this particular case, the machine is furnished with three 25 hp heads for simultaneously milling 3 sides of transfer cases, transmission cases, etc. Heads are adjustable both vertically and horizontally for handling a wide range of work. Sketch shows capacities between spindles for machine with 24" wide table. Machines can also be furnished with wider tables and greater capacity between spindles. Machine shown is provided with 14" dia. T. C. tipped cutters.



RIGIDMILS . FLUID-SCREW RIGIDMILS . AUTOMATIC LATHES . HYDRAULIC EQUIPMENT

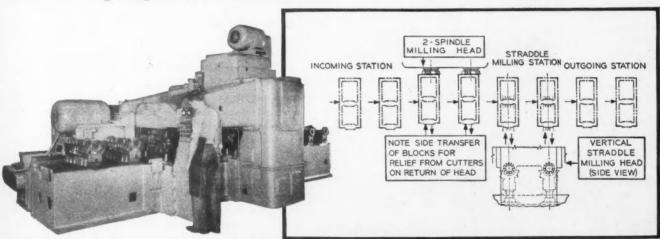
### 2. Standard Rigidmils with Special Heads and Tooling



This basically standard Sundstrand Rigidmil is equipped with a special five spindle head for milling five surfaces of a cylinder block simultaneously. Surfaces machined include the cylinder head, valve cover and manifold faces. The special head is provided with three vertical and two angular spindles carried in quills

having micrometer adjustment. An air operated fixture is mounted on the table and holds the block securely while machining. The machine is provided with an automatic table cycle of rapid approach, feed, rapid return and stop.

### 3 · Entirely Special Machines



This process type Sundstrand Rigidmil is designed to face mill the front end surface and straddle mill the main bearings of cylinder blocks. Four blocks are machined simultaneously and are shuttled through the machine automatically between milling operations. Operations performed as follows: two blocks move into first station and are automatically located and clamped. A two spindle horizontal head mills front ends. Clamps then release and same two blocks move to second station. After being located and clamped again the main bearings are straddle milled by a vertically fed head. Blocks are then unclamped and shuttled out of machine at a production rate of approximately 120 cylinder blocks per hour.



DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

Engineering Library

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## "GOOD OLD GAL-

### You've served us well"

Good old, faithful Nellie. When she was ''traded in for a new model'' it wasn't without many a loving pat and well earned tribute from those she served so long and well.

And today, faithful old "Mechanical Horses" are getting many a parting tribute too. Through the long shortage years the motoring public has learned to recognize and respect real quality—the fact that it takes the real McCoy in little things to make that big difference in motor vehicle life and economical upkeep.

Take, for example, that vital clutch release job. That's where trustworthy Aetna T Type bearings serve veteran vehicles so faithfully. Designed with unique, patented features which make for reserve stamina and long life these superior bearings long ago proved themselves "Naturals" for tough times like these.

That's why leading car, truck and tractor manufacturers first standardized on Aetna Clutch Release Bearings
—why they've never switched from them. They're ready and worthy for your vehicles too. May we send you a sample for test?

AETNA BALL and ROLLER BEARING COMPANY
4600 Schubert Avenue, Chicago 39, Illinois

In DETROIT: SAM T. KELLER 2457 Woodward Avenue Phone: CADillac 2040

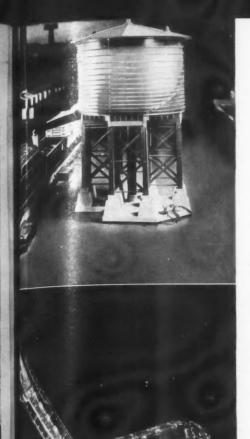
### **BETTER BECAUSE:**

Large capacity, beveled lubricant chamber insures constant circulation and life-long retention of lubricant.

T-shaped, sturdy, one-piece, oil-filled bronze ball separator maintains fixed alignment, provides the added smoothness and durability of steel to bronze contact.







# Originality Unlimited!

-that's the thrill of working with plastics!

### TOYS that make Grown Men Envious!

A water-tower that works—a magnetic crane that picks up and deposits loads—in miniature! These fascinating new LIONEL replicas will delight designers and production men who take the time to examine how they were made. Both were molded from BAKELITE Styrene Plastic—quickly, simply and cheaply—for the maximum in realism and sturdy strength. Another example of excellent design in a versatile medium!

# BAKELITE NEWS (1) NOTES ON BETTER, FASTER, LOWER COST PRODUCTION WITH PLASTICS

NICE WORK
... and you can
get it!

It's always nice to work in such delightful surroundings as these modern offices... with furniture and wall paneling made of laminated plastic sheet impregnated with BAKELITE phenolic resins. Not half as expensive as they look! And they clean easily and possess excellent wear resistance. Scores of surface effects available including authentic wood veneers.

The TOASTMASTER TOASTER tells a story

3 Yes—a story in three parts. Plastic parts! It's a story that goes back many years but is always new and fresh. A story of economy in manufacture, of superior performance in heat resistance, mechanical strength, impact strength, dielectric properties and beauty of finish. It's the story of BAKELITE phenolic plastics for functional parts—a story that reaches its climax at the point of sale!

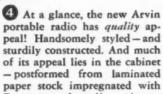






### A One Rece Cabinet

that steps up styling . . . and production, too!



BAKELITE phenolic resin varnishes. Six blanks at a time are stamped from one large panel. Each is then re-heated and postformed in one simple operation to produce the complete cabinet shell . . . ready for final assembly. Result – speedy production with minimum finishing, low tooling costs, and high performance! . . . Have you investigated the possibilities of postformed laminates?







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BAKELITE CORPORATION
Unit of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, N.Y.

EVERY DESIGNER SHOULD KNOW ABOUT THE EXPANDING FAMILY OF PLASTICS

Check coupon below for information on specific subjects illustrated or write for copy of booklet G-8 "A Simplified Guide to Bakelite and Vinylite Plastics."

### There's MAGIC in this Formula!

5 Now you can get metal coatings that are extremely bard—yet flexible enough to be mar-proof, long-lasting, maintaining both appearance and protective quality under abusive service! Ideal for coating in the flat sheet before the manufacturing cycle begins. These unique coatings are based on BAKELITE resin XJ-17997.



### Extra Speed for Fast-Selling Items!

6 Many a fast-stepping product can be given an extra burst of sales-speed with a package molded from BAKELITE Styrene Plastic! Versatile, light in weight, strong, available in all colors of the rainbow, this material presents a challenge to creative package designers!

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☐ 1. Molded Styrene Plastics ☐ 4. Postformed laminates

\_\_\_\_ 1. Molded Styrene Plastics

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 2. Laminated Sheet materials ☐ 5. Metal coatings based on XI-17997

3. Phenolic Molded parts

☐ 6. Styrene plastic packages

Your Name\_

Your Company\_

Address

\_City\_\_

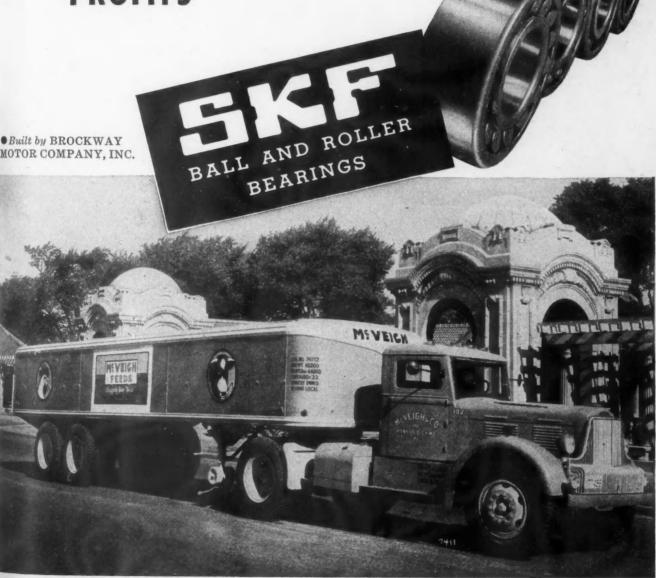
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How Brockway
trucks
use bearings
for MORE
PROFITS

Add up the thousands of miles that SEF Self-Aligning Propeller Shaft Boxes have accumulated on Brockway trucks. Check the low maintenance costs of SEF Bearings. Note the absence of bearing trouble over long periods. Then you'll readily understand why Brockway—like all other leading bus and truck manufacturers—repeat with SEF year after year. SEF Bearings are ruggedly built to withstand the jerks and jolts imposed upon the propeller shaft. Their rolling alignment compensates for chassis weave and frame distortion. They need only infrequent lubrication for long, useful service. These are the advantages that total lower costs per mile, on-time schedules, and greater profits.

**過以下 INDUSTRIES, INC., PHILADELPHIA 32, PA.** 



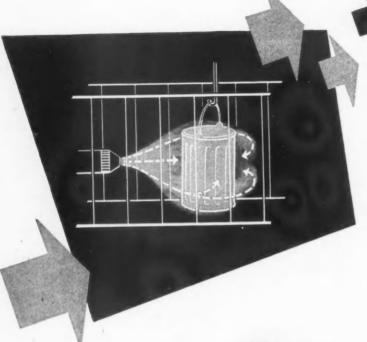
## Spray it ... AUTOMATICALLY AND

### **ELECTROSTATICALLY!**

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When paint is applied between Ransburg electrodes, particles sometimes turn 180° to return to the product being painted. Compare this to all other methods that waste up to 65% of paint in overspray.





For a more complete explanation of the way Electrostatic Spray-Painting can meet your finishing requirements, please write for our new booklet . . . without obligation.





Half the coating material, higher productivity per machine hour . . . plus a higher quality finishradio tubes at RCA Victor, Harrison, N.J.



75% less labor required, production increased... paint cost per unit cut more than 50%—folding chairs at Clarin Mfg. Co., Chicago, Illinois.



Consistently uniform finish on matching wall panels . . . continuous production with almost 50% savings in paint—Martin-Parry Corp., York, Pa.



Twice the production in much less booth space ... paint goes three times as far, and finish is improved—bicycle lamp shells at Delta Electric Co., Marion, Indiana.

Let RANSBURG test coat your product . . . and demonstrate the quality control and savings YOU can effect!

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Fully Automatic
Nothing to Pump

Drivers of more than a million motor cars and trucks are finding that Trico's automatic Windshield Washer is an important contribution to safer driving.

In making factory installations, Buick, Cadillac, Oldsmobile and Pontiac are gratifying an ever-increasing public demand for the famous "Two Little Squirts." Other important makes, too, are piping new production for easy dealer installation. Its low initial cost and costless operation en-

courage universal use.



A single touch of the button squirts water continuously for 16 seconds in the path of the wiper blades . . . to wash the windshield clean.



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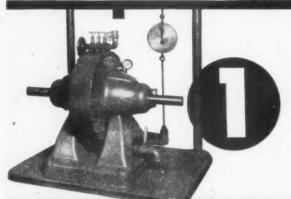
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TRIES

# Precision Tools to do 3 Fine Jobs



#### **TAYLOR HI-EFF DYNAMOMETERS**

Want to get accurate checks on B.H.P. — Torque — Friction, Fuel and Life Curves? Then get a Taylor Hi-Eff Hydraulic Dynamometer. There's a size to fit your need — 72 different capacity models ranging from 3½ HP at 25,000 RPM to 6000 HP at 750 RPM. Obtainable as Power Absorption or Special Types to meet requirements. Reversible if desired. Taylor Hydraulic Dynamometers offer you the most economical upkeep and investment costs per hour of use. Taylor engineers will be glad to make recommendations for your needs.



#### TAYLOR HI-EFF BALANCER

Sure way to cut vibration, get longer life and greater safety from your product, is to balance rotating parts. The Taylor Hi-Eff Balancing Machines give you high speed production, 180 auto fans per hour, 200 auto tires per hour, 80 grinding wheels per hour, 60 clutch assemblies per hour—are typical results reported by users. Nine different capacity models are now available—other models available to meet special requirements. Taylor engineers will be glad to make recommendations for your specific problem.



# 3

#### TAYLOR HI-EFF PRECISION DRILLING MACHINES

For truly fine precision drilling of holes from .002" to  $\frac{5}{8}$ "—nothing could be better than a Taylor Hi-Eff Precision Drill. Speed ranges from 800 to 40,000 RPM. Two series available in 10 drill diameter ranges. Depending on size, run-out of spindles is held from .0001" on small hole diameter machine to .0005" on largest hole capacity machine. These are ideal machines for fine accurate hole drilling such as required for diesel fuel injection nozzles and precision instrument manufacture.



Separate bulletins giving valuable detailed information on the range and uses of these tools are available on request. Write on your business letterhead specifying the bulletins desired.

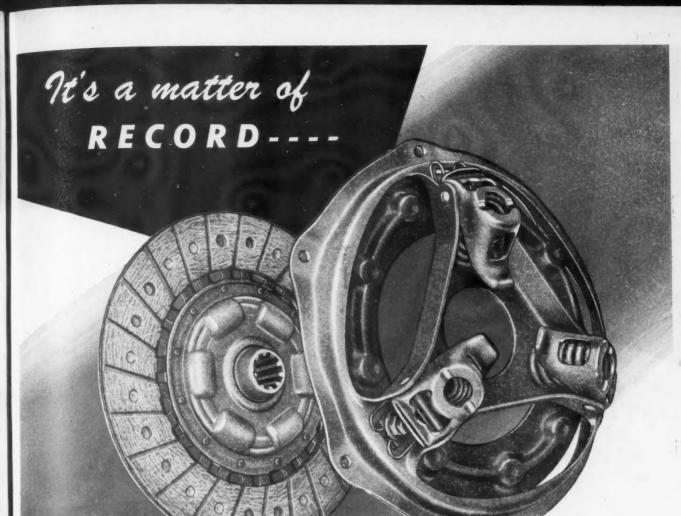
Bulletin No. 760—Dynamometers 761—Static Balancers 752—Precision Drills HI-EFF

Dynamometers • Static Balancers
Precision Drills

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The performance record of over a million Auburn clutches demonstrates conclusively the advantages of the original Auburn clutch principle as a sound, economical solution to your clutch problems.

Designed for simplicity...built for dependable precision operation AUBURN — Takes all of the power all the way

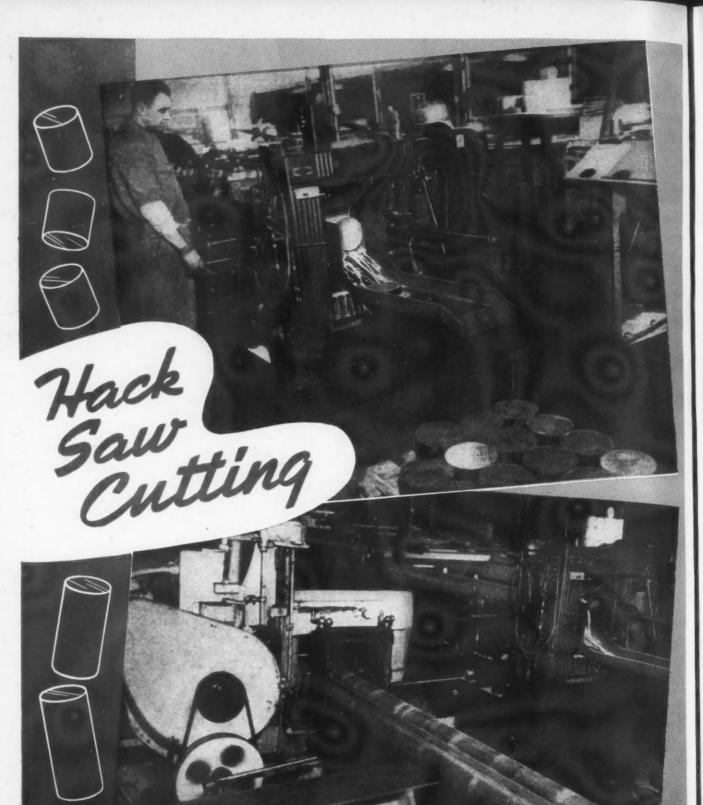
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# "KEY PEOPLE" - When You Need Steel

Ryerson's function is not only to supply your steel, but to deliver it on time. From the moment the Ryerson switch-board flashes your incoming call until the steel is laid down in your plant, a corps of helpful, intelligent employees well-trained in the Ryerson "Immediate Steel" tradition are at your service.

The likeable young women at the switch-board, phone-order salesmen, dispatchers, crane operators, skilled warehousemen who cut, shear and shape stock sizes to fit your specification, truck drivers—all of them are key people at Ryerson—key people in your service, when you need steel!

In spite of shortages, we are putting forth every effort to serve all Industry to the best of our ability. Naturally, many sizes and certain products are out of stock. However, for the most part you can depend on Ryerson for immediate shipment of a wide range of steel products.

#### PRINCIPAL PRODUCTS rolled Mechanical Tubing To

**Boiler Tubes and Fittings** 

sheets, plates, shapes,

Allegheny Stainless-

Bars—hot and Cold rolled alloy steel reinforcing Structurals Plates—

ates— bars, tubing, etc.
Inland 4-Way Floor Plate Sheets and Strip Steel

Tool Steel Wire, Chain Bolts, Rivets Babbitt Metal Working Tools

& Machinery, etc.

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JOSEPH T. RYERSON & SON, INC., Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles

RYERSON STEEL

# NEWS of the

# **AUTOMOTIVE INDUSTRIES**

Vol. 98, No. 5

March 15, 1948

#### Ford and K-F Reductions Cut Weekly Output

The automobile industry spurted to within a near postwar production goal in the last week in February. but then dropped back again to previous levels of about 108,000 the following week. The reason for the decline was the sharp cutback in Kaiser-Frazer production, and the tapering off of Ford production in preparation of model changeover. Although Chrysler Div., which had been closed down two weeks in February because of a natural gas shortage, came back with a rush, the extra production was not enough to break previous records. Lincoln and Mercury production has already started on 1949 models, however, progress will necessarily be slow because of the kinks which always develop when bringing out a new model. Production of Fords will probably stop entirely early in April, and the loss of this volume production together with the reduced K-F schedules leave a production gap for other companies to fill that is probably too big to be met within the present framework of present steel supplies. Accordingly the prospects for exceeding the postwar high mark of 120,000 units a week made in December do not appear propitious for the next several weeks at least

#### Crosley Cuts Sedan Price By \$19

Attributed to substantially increased output in the Cincinnati and Marion, Ind. plants, a cut of \$19 in the factory list price of its sedan has been announced by Crosley Motors, Inc. This reduction in the list price of the sedan from \$888 to \$869 followed a recent reduction in the price of the Crosley convertible from \$949 to \$899. Crosley also revealed that improvements have been made in the engine including four piston rings instead of three with the top compression ring chrome plated; greatly increased hardness of cylinder walls; a 35-ampere generator with voltage control compared with the earlier 15ampere type; positive fresh air crankcase ventilation; and quieter engine operation.

#### WE REGRET

Compositors in commercial printing plants in Philadelphia went on strike on February 26th. That action affects operations of Chilton Co., owners and publishers of Automotive Industries and other business magazines, as well as some 25 other printing establishments in that city.

Automotive Industries regrets that the strike made it impossible to bring out the March 1st issue. However, arrangements have been made whereby, beginning with this, the March 15th, 1948 Annual Statistical Issue, regular publication on the 1st and 15th of each month will be resumed and maintained.

#### Chrysler Nets \$67 Million For Year 1947

Pointing out that output continued to be limited to a rate of about two-thirds of capacity because of materials shortages, K. T. Keller, president, Chrysler Corp. reported that sales of the corporation and its wholly-owned U. S. subsidiaries totaled \$1,362,626,

751 in 1947 compared with \$870,000,-412 for 1946. Net earnings for 1947 amounted to \$67,181,221 as contrasted with \$26,889,290 for 1946. United States sales of Plymouth, Dodge, DeSoto, and Chrysler passenger cars and Dodge trucks were 944,379 vehicles, and including Canadian sales the total was 1,005,566. U. S. unit sales in 1946 were 677,379.

#### To Equip Jeepster With Overdrive

The jeep sports phaeton, Willys-Overland's forthcoming entry into the 1948 automotive field, will be equipped with overdrive, Delmar G. Roos, W-O vice-president in charge of engineering announced recently. To be known as the "Jeepster" it is expected to be introduced in May.

#### Packard Output Increase Indicates More Steel

Packard Motor Car Co. has apparently completed previously announced plans to acquire larger supplies of sheet steel. During the first week in March it produced 2087 cars, the highest volume for any single week during the postwar period. Highest previous week's production was 1455 cars made in February. Packard is hoping to build more than 90,000 cars this year, compared with 55,477 in 1947. The company has also revealed that it has approximately \$30 million in working capital.



#### RECENT NASH ADDITION

Equipped with an automatically controlled top, this new 1948 Nash convertible, with a 121-in. wheelbase, is powered by a valve-in-head, six-cyl engine developing 112 hp. This model has the new larger, lower-pressure tires, and is priced at \$2250, factory delivered.

## NEWS of the AUTOMOTIVE INDUSTRIES

#### To Offer 1949 Lincoln In 3 Model Lines

Latest information on the new Lincoln models is that they will consist of three principal lines. Scheduled for introduction in April are two new models to be called the Lincoln and the Lincoln Cosmopolitan. They will be available in eight body styles. Production of the present Continental model will continue for a time, but later in the year will undergo a complete revision. It is understood that the Cosmopolitan will be the larger of the two new models. It will be powered by completely new V-8 engines of approximately 150 hp.

It is reliably reported that the new Mercury and the smaller of the new Lincoln models will have the same basic body shell. Considerable manufacturing economy can be realized from such an arrangement which is similar to that which GM

has followed for several years with its A, B, and C body series. The cost of tooling the 1949 Lincoln and Mercury lines is set at approximately \$50 million, according to Benson Ford who recently held his first press conference since becoming head of the L-M Div. He said that L-M hopes to produce 250,000 cars this year, and that such a production total would represent 12.8 per cent of the medium and high priced market expected this year. He revealed that when 1949 production starts, Lincoln and Mercury output will begin at the three new L-M assembly plants at Metuchen, N. J., St. Louis, and Los Angeles. Capacity of the three assembly plants and the Detroit operations is about 1500 cars a day, about double the current rate. The L-M Div. now has 1061 dealers and the number will be expanded to a total of more than 1600 in another

#### Bendix Aviation Corp. Nets \$5 Million in '47

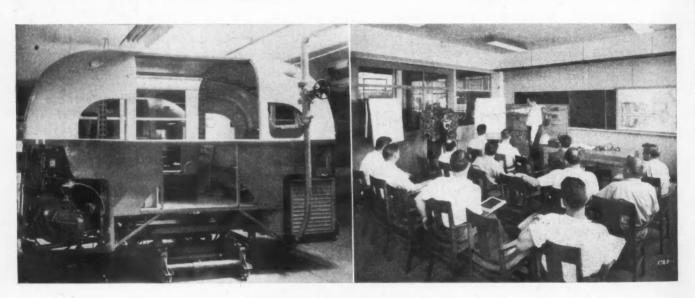
With automotive product sales accounting for about 38 per cent of fiscal 1947 sales, Bendix Aviation Corp. recently reported a consolidated net income, before extraordinary reserve adjustments, of \$5,248. 999 for the fiscal year ended Sept. 30, 1947 on sales of \$141,625,820. The company had a net operating loss of \$12,615,046 for fiscal 1946. which was reduced by \$9.2 million estimated carryback tax refund, and a special credit of \$4,200,960 representing costs of postwar reconversion, resulting in a consolidated net income of \$785,914 for that year. Sales of Bendix automotive products aggregated \$53 million in fiscal 1947 compared to \$26.7 million in

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#### PREACH AND PRACTICE

A training school for motor coach mechanics to teach proper maintenance and overhaul of the GM series 71 Diesel engine used in over 14,000 motor coaches has been established by GM Coach. Four GM coach engine compartments and rear ends have been built up and coupled to form two dual units, one of which is shown at the left. Each half of these dual

units contains a complete engine and hydraulic transmission power plant assembly, effectively implementing training. Careful class instruction, seen at the right, is a necessary complement of laboratory work. The course was designed by GM Coach in cooperation with GM's Detroit Diesel Engine Div. and the GM Institute in Flint, Mich.

## For New Model

Feverish activity is under way at the Ford Rouge plant in preparation for production of the 1949 models. More than a thousand men have been at work for a month moving heavy machinery and rerouting conveyer lines, indicating that plant layout is being modernized and made more efficient. The work involves moving more than 200 machines and presses to the Mound Road plant; building a conveyer line for frame assembly; moving 400 machines out of the gear and axle building and rearranging 471 units within the building, a large conversion project in the press steel building involving relocation of large presses; and converting Mercury and Ford lines for final assembly.

#### Hoppenstand to Build Small Car

Hoppenstand Industries, Inc., Greenville, Pa., intends to build a small automobile which will sell for about \$500, according to Davis S. Hoppenstand, president. To be known as the Gregory 555, the automobile, with an aluminum body, and powered by a one-cyl 4.2 hp engine mounted in the rear, will be 12 ft in length and four ft in width.

M

## NEWS of the AUTOMOTIVE INDUSTRIES

#### KILROY IS HERE

Capable of completely servicing units on heavy construction jobs, this new trailer, to be produced by Jax inc., Pittsburgh, contains 700 gal gasoline and Diesel oil, 200 gal oils and greases, also water, anti-freeze, and compressed air.



#### 1947 Truck-Trailer Output Totaled 53.112

A dip in truck-trailer production in 1947 was shown with the announcement that in 1947 production amounted to 53,112 truck-trailers of all types as compared with 76,234 for 1946, according to the Bureau of the Census. Shipments totaled 55,516 in 1947 as against 73,001 in 1946.

#### Labor

### Wage Negotiations Start At Chrysler & GM

All evidence points to Chrysler Corp. as the bellwether in setting the pattern for the expected third round of wage increases in the automobile industry. Negotiations started there late in February. Chrysler workers are asking a flat 30 cents an hour wage increase plus a health insurance plan, an adequate pension plan, guaranteed weekly wage, three weeks vacation for employes with five years seniority, and a corresponding increase in vacation for employes with less than five years of service. The fringe demands are estimated to cost the company five cents an hour, bringing the total of all demands to 35 cents an hour.

Wage negotiations between GM and the union are also underway, having started the middle of this month. Demands call for a 25 cents an hour increase of which 10 cents may be used for establishing an adequate old age retirement plan; five cents an hour for a comprehensive group insurance program; equalization of rates by job classification on a company-wide basis; a guaranteed 40-hour work week; time and a half for Saturday and double time for Sunday; triple time for holidays worked; increase in night shift plans; elimination of merit spreads; time off for voting on primary and election days; revision of present vacation allowances; and the union shop and check off. It is believed that the major pressure will be applied to Chrysler since there has been strong objections in GM locals to be again being made the guinea pig in wage negotiations.

#### Flint Local Proposes \$15 Vehicle Assessment

A Flint local made an interesting proposal that a \$15 assessment be levied against every vehicle produced by GM to finance a pension plan to be administered by the union. Objective of the plan would be retirement pay equal to going weekly wages after 25 years of service. Despite the optimistic demands of the union it is still generally believed in Detroit that settlement of wage increases will be in the neighborhood of 10 to 12 cents an hour if that, and nothing more in the way of social benefits.

#### Hudson Foremen Sign 1-Year Contract

Hudson Motor Car Co. has agreed to a one-year contract with its 550 foremen. The agreement is with the Hudson Supervisors Association and covers grievance procedure, sick leave, discharges, and other conditions of employment. The contract ignores the FAA which struck the Hudson plant in January in an effort to force recognition as bargaining agent.

(Turn to page 192, please)



#### DESIGNED FOR BEER

Built for the Miller Brewing Co., Milwaukee, this new Dodge truck was specially designed by the Brookes-Stevens Co. Said to cost \$21,000, it is known as a WK-65 Gemmer conversion heavy duty truck and it can carry 300 cases of beer or barrel equivalent. It has a 136 in. wheelbase, is 96 in. wide, 113 in. high, and 246 in. in overall length.

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# How Friction Looks to Cobean



Work COBEAN'S idea of friction is a battle between the sexes. But if you are a manufacturer, your idea of friction is certainly the battle between moving parts.

Here is where ball bearings fit into your picture . . . They operate with less friction, therefore permit higher speeds, mean faster production—lower costs. Let New Departure, world's largest maker of ball bearings, help you bring down production costs. Write for technical literature.

Nothing Rolls Like a Ball

#### NEW DEPARTURE BALL BEARINGS



• A native of Gettysburg, Pennsylvania, Sam Cobean edited the comic magazine at the University of Oklahoma, as a preliminary to becoming a contributor of droll, amusing cartoons to national magazines.

NEW DEPARTURE . Division of GENERAL MOTORS CORPORATION . BRISTOL, CONNECTICUT . BRANCHES IN ALL PRINCIPAL CITIES

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#### AUTOMOTIVE INDUSTRIES

# Profits in 1947 Lower than in 1940 Relative to National Income

HILE it is generally believed, at the popular level, that 1947 corporate profits were excessive and that high profits are responsible for current high prices, it is pointed out by informed

specialists that, actually, profits available for industry, after paying necessary expenses, were lower, relative to national income, in 1947 than they have been in any previous year of even fairly good business. Business, it is asserted, has been running at high volumes and selling at a perilously narrow margin of profit.

In an attempt to meet the needs of the market, business has made heavy commitments for new plant and equipment. It has been difficult to obtain additional equity capital. As a result, business has found it necessary to get the funds needed for expansion by means of bond issues, bank loans, and by drawing down its cash account.

In spite of brisk profits and conservative dividends, many manufacturing businesses are discovering that their cash is disappearing. Why is it that corporations reported almost \$28 billion in profits, paid less than \$7 billion to stockholders, and at the same time had to borrow \$4 billion?

In 1947, 2520 manufacturing businesses failed with current liabilities of

\* Cash Increases.

\$142,727,000. The number of failures is higher than for any year since 1940. The current liabilities of these insolvent enterprises is more than twice the amounts involved in 1940.

Sources and Uses of Corporate Funds For All U. S. Corporations Except Banks & Insurance Companies

Profits and Taxes: Profits of corporations before taxe Corporation income taxes		(In Billions) \$27.8 11.2
Corporate profits after taxes  Expenditures Necessary to Keep Production at the Same Level:  Actual cost of replacing plant an equipment over and above depre	d	\$16.6
ciation  Cost of replacing inventories at high		2.0
er prices		4.6
Disposable Profits	. \$6.0	\$10.0
Disposable Profits as a Percent of National Income  Cash Required for Business Expansionand Dividends:	. 7.4%	4.9%
Investments in plant expansion Increase in physical volume of inven		\$ 7.5
tories Cost of expansion Dividends to stockholders	\$ 1.6	\$ 9.7 6.6
Total Corporate Payments for Expansion and Dividends		\$16.3
How Cost of Expansion and Dividend were Financed:	ls	
Using disposable income shown above Selling new common and preferre	e 6.0	10.0
stock  Borrowing through long-term ban	1	1.3
loans and sale of bonds and note		4.0
Decreasing cash working capital .		1.0
	\$5.7	\$16.3
Detained Formings		
Retained Earnings	1.9	9.7
Expansion		-5.0
Less new equity investment	1	-1.3
Total Retained Earnings	\$2.2	\$ 3.4

Most business organizations are required by the Treasury Department to keep their books in a manner which reflects profits in terms of the original dollar costs actually incurred in earning that profit. Today's production costs - and the profit—are computed on the basis of material on hand which was bought when prices were lower. As production continues, this material bought at the former low price is used up and has to be replaced at today's higher prices. This added cost of materials is one of the factors that cuts into the cash held by corporations. Thus a large part of the reported profits are not available for dividends or expansion.

Another significant item about reported high profits is the fact that depreciation costs for plant and equipment are based on the lower prices which were paid when these assets were acquired. Income tax regulations do not permit depreciation at the present high prices of machinery and equipment. This means that a company is required to set aside enough money out of the reported prof-(Turn to page 267, please)



# Our PETROLEUM

#### Crude Petroleum and Petroleum Products **Supply and Demand\***

#### (Thousands of Barrels Yearly)

DOMESTIC PRODUCTION Crude Oil Natural Gasoline, Benzol, etc.	1947† 1,854,470 132,274	1946 1,733,424 117,223	1945 1,713,655 114,884	1941 1,402,228 84,290	1937 1,279,160 51,967
Total	1,986,744	1,850,647	1,828,539	1,486,518	1,331,127
IMPORTS Crude Oil	95,781 61,896	86,067 48,983	74,337 39,282	50,606 46,536	27,484 29,673
Total TOTAL NEW SUPPLY	157,680 2,144,424	135,050 1,985,657	113,619 1,942,158	97,142 1,583,660	57,157 1,388,284
STOCK CHANGE, ALL OILS	+2,239	+43,476	-13,510	-10,949	+45,768
INDICATED TOTAL DEMAND	2,142,185	1,942,181	1,955,668	1,594,609	1,342,516
EXPORTS Crude Oil Refined Products	45,245 119,761	40,771 110,449	32,998 149,985	33,238 75,592	67,234 106,077
Total	165,006	151,220	182,983	108,830	173,311
INDICATED DOMESTIC DEMAND Motor fuel Kerosine Gas Oil and Distillate Residual Fuel Oil Lubricating Oil Other Products and Losses	289,612 492,534 42,981	734,833 89,166 242,965 475,944 34,884 213,169	696,333 75,573 226,084 525,034 35,334 214,327	667,505 69,469 172,824 385,149 30,255 160,577	519,352 54,972 116,841 325,514 23,323 129,203
Total	1,977,179	1,790,961	1,772,685	1,485,779	1,169,205

TOE RUN TO STILLS.

\*—Source of data—American Petroleum Institute and Bureau of Mines.

†—Partly estimated.

#### **Increased Consumption of Oil Products** in 1947 Compared with 1941.

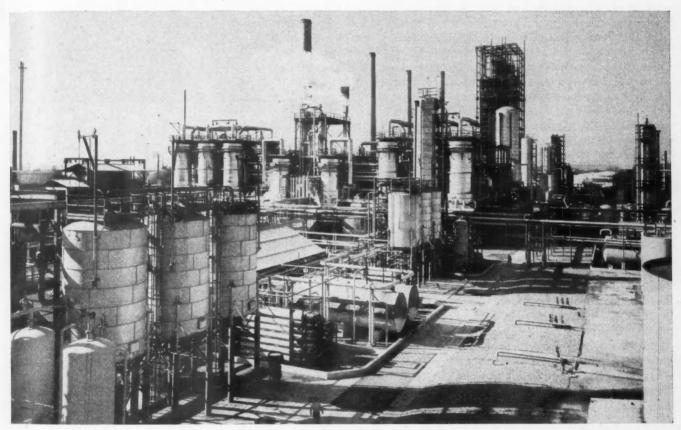
gal. i	or		1,300,000 New Oil Burners
gal. f	or		30,000,000 Motorists
gal. f	or		7,000,000 Trucks and Buses
gal. f	for		Armed Forces
gal. f	or		
gal. f	for		Farmers
gal. 1	for		Industry (heat, power, lubrication)
gal. i	for		New Products, made from Petroleum
gal.	for		Users of Liquified Gas
gal.	over 1941.		Largest Prewar Year
gal.	over		Biggest War Year
	gal. fi gal. fi gal. fi gal. fi gal. fi gal. fi gal. fi gal. fi	gal. for gal. over 1941.	gal. for

THE petroleum industry, in 1947, supplied American consumers with the astounding total of 1,977,-179,000 barrels of petroleum products which is 807,974,000 barrels, or 69 per cent more than was supplied in 1937. The per capita consumption in 1947 was 576 gallons as compared with 381 gallons in 1937. For all American con-

- ★ Production and Consumption
- \* The Extent and Source of Increased Demand
- \* Inventories and Reserves

# Supply

By Benedict Saurino



Photos Courtesy of Sun Oil Co.

sumers in 1947 the rate of consumption was 158,000 gallons per minute.

Last year this nation consumed more than twice as much oil as the rest of the world while in 1937 it used only one-third more oil than all the other nations combined. The rate of consumption increase last year was more than double the change which occurred during the previous ten years. A continuation of this increase for the next ten years will result in a demand for 2,328,000,000 barrels in the year 1957, at a consumption rate of 186,000 gallons per minute.

Fears of a possible gasoline shortage this summer appear to be ill founded at this time. During the past four months, the petroleum industry has produced, daily, 206,900 more barrels of gasoline than it did in the comparable period last year. This quantity represents 9.6% of the daily average gasoline consumption in 1947, and estimates of the Economic Advisory Committee of the Interstate Oil Compact Commission and other economists in the petroleum industry indicate that 1948 consumption of gasoline will be only 6% to 7% above the 1947 demand. (Turn to page 84, please)

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#### Our PETROLEUM Supply

(Continued from page 83)

Increased production of gasoline has been achieved by the petroleum industry despite the fact that yields of this product have been reduced to maximize the output of heating oils. It appears evident that even a continuation of the present yield level of gasoline from crude petroleum will be ample to supply the motor fuel needs of the American consumers during the coming summer. The practice of the industry historically has been to increase yields of gasoline at the expiration of the heating season.

Finally, it should be noted that inventories of gasoline today are at the levels existing a year ago. There is, therefore, only one problem which may arise to cause temporary local shortages, namely, that of distribution. This possibility is not evident at this time and whether or not it materializes will depend in large measure upon the incidence of greater than average increases for specific local areas.

How has this enormous rate of consumption affected the nation's supply of oil? On January 1, 1937, the known proved reserves of crude petroleum in the United States amounted to 13,063,000,000 barrels. After meeting all the civilian requirements during the prewar years, all of the military and

# TOTAL CONSUMPTION OF PETROLEUM PRODUCTS

for Domestic and Foreign Use (Daily Average)



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civilian needs, not only for Americans, but for their Allies during the entire war period, and finally, after supplying unprecedented postwar demands during the recent period of transition, the petroleum industry on January 1, 1947 reported known proved reserves of crude oil amounting to 20,873,560,000 barrels. This is an increase of 7,810,560,000 barrels, or about 2,300 gallons more for each and every person in the United States today than the reserves available in 1937.

In addition to this reflection of the petroleum industry's unceasing efforts to locate new crude petroleum reserves, there was also reported on January 1, 1947, an additional amount of 3,353,887,000 barrels of

#### Wells Drilled In United States

		Dil	Gas and	Distillate	Total Pro	ductive Wells	Dry	Holes	Total	Producing
Year	Number Drilled	% of Total Drilled	Wells Drilled	Oil Wells End-of-Year						
1927	13,396	60.06	2,586	11.60	15,982	71.66	6,319	28.34	22,301	323,300
1937	22,481	71.71	2,500	7.97	24,981	79.68	6,370	20.32	31,351	363,030
1938	18,544	69.74	1,913	7.19	20,457	76.93	6,133	23.07	26,590	369,640
1939	17,687	67.25	1,943	7.39	19,630	74.64	6,670	25.36	26,300	380,390
1940	19,225	68.62	2,023	7.22	21,248	75.84	6,770	24.16	28,018	391,617
1941	19,472	67.06	2,582	8.89	22,054	75.95	6,984	24.05	29,038	403,582
1942	10,942	58.81	1,980	10.64	12,922	69.45	5,684	30.55	18,606	407,257
1943	9,541	55.77	1,615	9.44	11,156	65.21	5,952	34.79	17,108	407,581
1944	13,095	58.97	2,361	10.63	15,456	69.60	6,751	30.40	22,207	412,851
1945	13,737	58.20	2,634	11.16	16,371	69.36	7,231	30.64	23,602	421,433
1946	15,962	57.06	3,510	12.55	19,472	69.61	8,503	30.39	27,975	425,650
1947**	18,126	57.26	3,637	11.48	21,763	68.74	9,896	31.26	31,659	430,000

\* Source of Data, "The Oil Weekly" and "The Petroleum Almanac."

\*\*Partly estimated.

#### U. S. Crude Reserves and Domestic Demand 1927—1957

(Source: U. S. Bureau of Mines, and American Petroleum Institute)

Reserves and Demand in Barrels

	Reserves	Domestic Demand
Year	(First of year)	(Barrels)
1927	 8,800,000,000	803,177,000
1928	 10,500,000,000	860,241,000
1929	 11,000,000,000	940,581,000
1930	 13,200,000,000	926,642,000
1931	 13,600,000,000	902,593,000
1932	 13,000,000,000	835,230,000
1933	 12,300,000,000	868,200,000
1934	 12,000,000,000	919,838,000
1935	 12,177,000,000	983,317,000
1936	 12,400,000,000	1,092,379,000
1937	 13,063,400,000	1,169,205,000
1938	 15,507,268,000	1,136,705,000
1939	 17,348,146,000	1,230,486,000
1940	 18,483,012,000	1,326,620,000
1941	 19,024,515,000	1,485,779,000
1942	 19,589,296,000	1,449,908,000
1943	 20,082,793,000	1,521,426,000
1944	 20,064,152,000	1,671,263,000
1945	 19,784,530,000	1,772,685,000
1946	 19,941,846,000	1,790,961,000
1947	 20,873,500,000	1,977,179,000
*1957		2,328,000,000

<sup>\*</sup> Estimated

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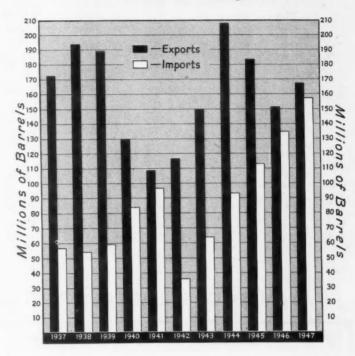
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# EXPORTS AND IMPORTS OF PETROLEUM PRODUCTS

for Domestic and Foreign Use



natural gas liquids reserves and a petroleum equivalent of natural gas reserves amounting to 26,762,648,000 barrels. In total, therefore, the reserves of all petroleum liquids including the natural gas liquid equivalent were 50,990,095,000 barrels as reported on January 1, 1947.

Intensive drilling for new oil and gas pools during the past year has assured the consuming public of a continuation of this increasing reserve ratio. Undoubtedly, more new oil was found than was produced, although actual figures are not available as yet.

Finally, the above ground stocks of crude petroleum and refined oils on December 31, 1947, were at a slightly higher level than the inventories reported on January 1, 1937. Despite all the handicaps resulting from allocations of materials which reduced the drilling rate during the war and since the end of hostilities, and in the face of astonishing increases in petroleum consumption, the oil industry has not only met its responsibilities to all segments of our economy and the world, but also has increased significantly its known, proved reserves during the past decade.

#### Stocks and Daily Supply on Hand\*

End-of-the Year in Barrels

	Motor	Fuel	Kei	rosine	Distilla	ate Fuel Oil	Residual Fuel Oil	
Year	Stocks	Days Supply on Hand†	Stocks	Days Supply on Hand†	Stocks	Days Supply on Hand†	Stocks	Days Supply on Hand†
1927	34,115,000	35.5	7,715,000	49.3				
1937	81,748,000	53.5	7,083,000	40.5	22,566,000	56.0	95,019,000	101.7
1938	76,510,000	48.7	7,799,000	44.6	27,873,000	69.1	114,213,000	135.4
1939	87,286,000	53.1	7,756,000	41.1	33,718,000	73.7	105,620,000	112.0
1940	90,113,000	53.6	9,512,000	48.2	42,940,000	87.3	101,210,000	103.6
1941	98,373,000	51.7	14,515,000	72.9	49,926,000	96.0	93,374,000	85.3
1942	84,758,000	49.6	10,064,000	50.8	44,940,000	79.2	72,648,000	63.4
1943	79,868,000	47.0	9,359,000	46.6	41,728,000	65.3	56,773,000	42.8
1944	91,082,000	45.5	11,150,000	53.2	38,333,000	48.4	56,490,000	39.3
1945	101,998,000	47.5	10,421,000	46.5	35,778,000	50.3	41,654,000	28.3
1946	97,723,000	45.7	17,081,000	63.7	59,620,000	79.9	52,797,000	39.7
1947**	97,557,000	45.5	16,071,000	59.5	50,045,000	64.8	51,560,000	36.9

<sup>†-</sup>For Domestic and Export Demand.

<sup>\*—</sup>American Petroleum Institute and Bureau of Mines. \*\*Partly estimated.

#### Strikes in All Industry-By Years-1928-1947\*

		Num		-Average Man-Days Lost-			
	Strikes†	Workers Involved†	Workers per Strike	Man-Days idle	Per Strike	Per Worker Involved	
1928	604	314,210	520	12,631,863	20,914	40	
	921	288,572	313	5,351,540	5,811	19	
	637	182,975	287	3,316,808	5,207	18	
1931	810	341,817	422	6,893,244	8,510	20	
1932	841	324,210	386	10,502,033	12,488	32	
1933	1,695	1,168,272	689	16,872,128	9,954	14	
1934	1,856	1,466,695	790	19,591,949	10,556	13	
1935	2,014	1,117,213	555	15,456,337	7,674	14	
1936. 1937. 1938. 1939.	2,172 4,740 2,772 2,613 2,508	788,648 1,860,621 688,376 1,170,962 576,988	363 393 248 448 230	13,901,956 28,424,857 9,148,273 17,812,219 6,700,872	6,401 5,997 3,300 6,817 2,672	18 15 13 15	
1941	4,288	2,362,620	551	23,047,556	5,375	10	
1942	2,968	839,961	283	4,182,557	1,409	5	
1943	3,752	1,981,279	528	13,500,529	3,592	7	
1944	4,956	2,115,688	427	8,723,000	1,760	4	
1945	4,750	3,467,000	730	38,025,000	8,005	11	
1946	4,985	4,596,400	922	116,032,000	23,276	25	
1947‡	P 3,290	P 2,265,000	P 689	P 31,775,000	P 9,650	P 14	

‡-Eleven Months.

P-Preliminary data.

†-Strikes beginning in month or year.

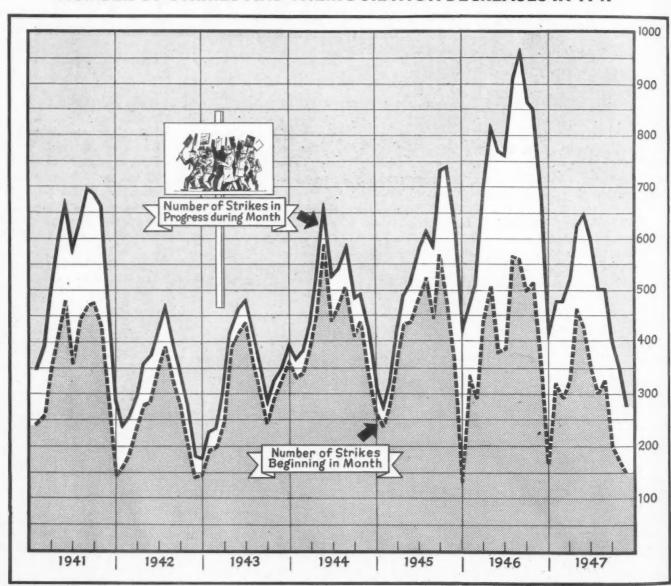
\*-Bureau of Labor Statistics.

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#### **NUMBER OF STRIKES AND THEIR DURATION DECREASES IN 1947**



#### **COST OF LIVING**

#### Average Wages vs. "Real Wages"

			Cost of							Cost o		
			ing Inde							iving In		
		ly Wages	1935-	-Real V					y Wages	1935-	-Real-V	
Year and	All	Auto	1939=	All	Auto		Year and	All	Auto	1939=		Auto
Month 1941	Industrie	s Industry	100	Industries			Month 1945		s Industry	100	Industries	
January	\$27.71	\$37.61	100.8	\$27.49	\$37.31			\$47.50	<b>\$59.42</b>	127.1	\$37.37	\$46.75
February .		40.05	100.8	28.33	39.73		February .	47.37	59.45	126.9	37.33	46.85
March		40.61	101.2	28.76	40.13		March		58.99	126.8	37.38	46.52
	00 48	36.36	102.2	28.54	35.58		April		58.28	127.1	37.07	45.85
April	00.70	41.56	102.9	29.91	40.39		May		55.74	128.1	35.92	43.51
May	04 00	45.68	104.6	30.48	43.67		June		55.55	129.0	35.91	43.06
June	04 00	40.79	105.3	29.65	38.74		July	400 400	53.29	129.4	35.12	41.18
July		41.09	106.2	29.81	38.69		August		41.70	129.3	32.27	32.25
August					38.59		September		44.65	128.9	31.70	34.64
September	32.06	41.72	108.1	29.66								
October		44.32	109.3	30.09	49.55		October		46.86	128.9	31.78	36.35
November		43.84	110.2	29.76	39.78		November		46.72	129.3	31.57	36.13
December 1943	33.69	40.97	110.5	30.49	37.08		December 1946	41.43	44.05	129.9	31.89	33.91
January	\$40.62	<b>\$55.85</b>	120.7	\$33.65	\$46.27		January	841.15	\$46.19	129.9	\$31.68	\$35.56
February .		55.71	121.0	33.98	46.04		February .		43.01	129.6	31.31	33.19
	44 88	55.62	122.8	34.00	45.29		March		46.75	130.2	32.37	35.91
March		55.77	124.1	34.23	44.94		April		48.72	131.1	32.70	37.16
April	40.00	57.00	125.1	34.44	45.56			40 84	48.05	131.7	32.28	36.48
May	10.05								49.32	133.3	32.49	37.00
June		57.10	124.8	34.66	45.75				51.15	141.2	30.72	36.23
July		57.18	123.9	34.51	46.15		July		53.80	144.1	31.22	37.34
August		57.41	123.4	35.27	46.52		August				31.11	36.58
mak and	44.39	58.43	123.9	35.83	47.16		September		53.37	145.9		
October		59.50	124.4	36.06	47.83		October		53.41	148.6	30.77	35.94
November		58.22	124.2	36.49	46.88		November		53.71	152.2	30.08	35.29
December	44.68	55.57	124.4	35.92	44.67		December	46.86	55.44	153.3	30.57	36.16
1944							1947			455.0		***
January	\$45.29	\$58.86	124.2	\$36.46	\$47.39			\$47.10	\$54.13	153.3	\$30.72	\$35.31
February .	45.47	58.13	123.8	36.73	46.95		February .		54.29	153.2	30.87	35.44
March	45.64	58.37	123.8	36.86	47.15		March		55.45	156.3	30.51	35.48
April	45.55	58.68	124.6	36.56	47.09		April	47.50	54.14	156.2	30.41	34.66
May		57.56	125.1	36.76	46.01		May		55.96	156.0	31.05	35.87
June		58.48	125.4	36.87	46.63		June	49.33	57.48	157.1	31.40	36.59
July	45 40	56.43	126.1	36.03	44.75		July		56.44	158.4	30.92	35.63
August		56.90	126.4	36.30	45.02		August		55.76	160.3	30.67	34.78
	46.24	55.98	126.5	36.55	44.25		September		59.35	163.8	30.79	36.23
	40.04	57.85	126.5	37.11	45.73		October	FO 45	60.30	163.8	30.07	36.80
								24 04	61.70	164.9	31.11	37.41
	46.86	58.19	126.6	37.01	45.96					167.0		
December	47.45	58.45	127.0	37.36	46.02		December	92.91	****	701.0	****	* * * *

<sup>\*</sup> Based on data from Bureau of Labor Statistics.

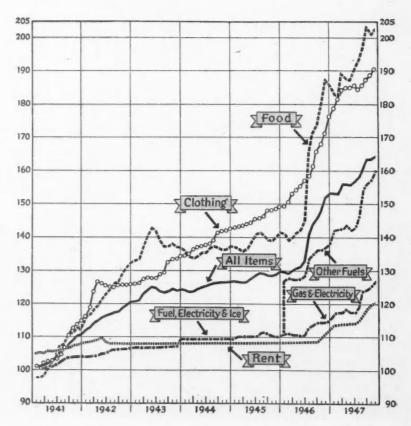
#### CONSUMERS PRICE INDEX

#### for Moderate-Income Families in Large Cities

1935-1939 = 100

	Items	Clothing	Food	Rent
	122.5	115.3	132.5	141.4
	119.4	112.7	126.0	137.5
	108.7	102.6	103.9	130.3
	97.6	90.8	86.5	116.9
	92.4	87.9	84.1	100.7
	95.7	96.1	93.7	94.4
	98.1	96.8	100.4	94.2
	99.1	97.6	101.3	96.4
	102.7	102.8	105.3	100.9
	100.8	102.2	97.8	104.1
	99.4	100.5	95.2	104.3
	100.2	101.7	96.6	104.6
	105.2	106.3	105.5	106.2
	116.5	124.2	123.9	108.5
	123.6	129.7	138.0	108.0
	125.5	138.8	136.1	108.2
	128.4	145.9	139.1	108.3
	139.2	160.2	159.6	108.6
*******	158.5	185.3	192.6	110.8
		119.4 108.7 97.6 92.4 95.7 98.1 99.1 102.7 100.8 99.4 100.2 116.5 123.6 125.5 128.4 139.2	119.4 112.7 108.7 102.6 97.6 90.8 92.4 87.9 95.7 96.1 98.1 96.8 99.1 97.6 102.7 102.8 100.8 102.2 99.4 100.5 100.2 101.7 105.2 106.3 116.5 124.2 123.6 129.7 125.5 138.8 126.4 145.9 139.2 160.2	119.4 112.7 126.0 108.7 102.6 103.9 97.6 90.8 86.5 92.4 87.9 84.1 95.7 96.1 93.7 98.1 96.8 100.4 99.1 97.6 101.3 102.7 102.8 105.3 100.8 102.2 97.8 99.4 100.5 95.2 100.2 101.7 96.6 105.2 106.3 105.5 116.5 124.2 123.9 123.6 129.7 138.0 125.5 138.8 136.1 125.4 145.9 139.1 139.2 160.2 159.6

Average for eleven months. \* Burean of Labor Statistics.

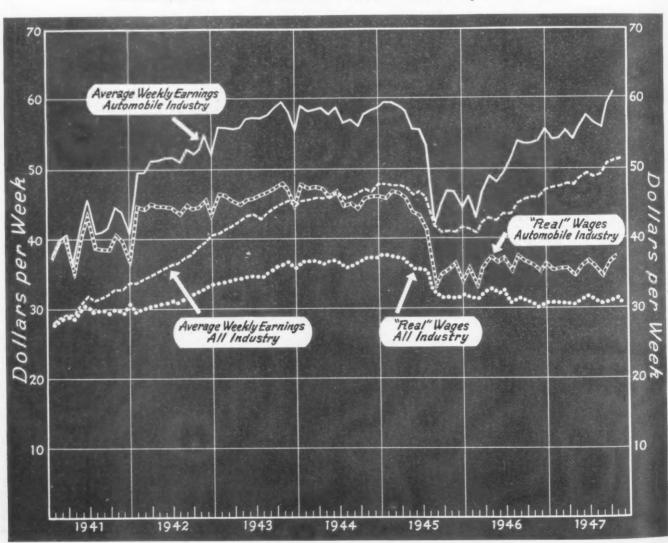


# Hourly and Weekly Earnings

#### IN THE AUTOMOBILE INDUSTRY\*

	arnings	Average Actual	Wash and Words	Average	Earnings	Average Actual
Hourly	Weekly	Hours per Week per Wage Earner	Year and Month	Hourly	Weekly	Hours per Week per Wage Earner
			1946			
.975 .982 .983 .104 .063 .066 .055 .079 .091	40.05 40.61 36.36 41.56 45.68 40.79 41.09 41.72 44.32 43.84	Not Available	January February March April May June July August September October November	\$1.230 1.248 1.264 1.302 1.325 1.347 1.354 1.373 1.385 1.376 1.394	\$46.19 43.01 46.75 48.72 48.05 49.32 51.15 53.80 53.37 53.41 53.71	37.5 34.5 37.0 37.4 36.6 37.8 39.2 38.5 38.5 39.7
.107	40.97		1947			
.279 .280 .280 .269 .268 .260 .245 .224 .219	59.45 58.99 58.28 55.74 55.55 53.29 41.70 44.65 46.86 46.72	45.2 46.5 46.1 45.5 43.8 42.3 33.5 36.5 38.4 38.3	January February March April May June July August September October November December	\$1.399 1.399 1.396 1.406 1.463 1.485 1.496 1.500 1.515 1.532	\$54.13 54.29 55.45 54.14 55.96 57.48 56.44 55.76 59.35 60.30 61.70	38.9 38.8 39.7 38.5 38.3 38.7 37.7 37.2 39.2 39.6 40.
	.969 .975 .982 .983 .104 .063 .066 .055 .079 .091 .116 .107 .314 .279 .280 .280 .269 .268 .269 .245 .224	.969 \$37.61 .975 40.05 .982 40.61 .983 36.36 .104 41.56 .063 45.68 .066 40.79 .055 41.09 .079 41.72 .091 44.32 .116 43.84 .107 40.97 .314 \$59.42 .279 59.45 .280 58.99 .280 58.28 .269 55.74 .268 55.55 .260 53.29 .245 41.70 .224 44.65 .219 46.86 .220 46.72	.969 \$37.61 .975 40.05 .982 40.61 .983 36.36	1946  .969 \$37.61 .975 \$40.05 .982 \$40.61 .983 \$36.36 .104 \$41.56 .063 \$45.68 .066 \$40.79 .055 \$41.09 .079 \$41.72 .091 \$44.32 .116 \$43.84 .107 \$40.97  .280 \$58.99 .46.1 .280 \$58.99 .46.1 .280 \$58.28 .45.5 .43.8 .40.90.90.90.90.90.90.90.90.90.90.90.90.90	1946   1946   1947   1948	1946

#### **EARNINGS OF PRODUCTION WORKERS, 1941-1947**



Feb Mai Apr Mai Jun July Aug Sep Oct Nov Dec 194

Apri Ma Jui Jui Au Se Oc No De

# and Hours Worked Per Week

#### In the U. S. 1941-1947

#### IN ALL INDUSTRIES\*

	Average Earnings		Average Actual Hours per Week	Year and Month	Averag	ge Earnings	Average Actual Hours per Week
Year and Month	Hourly	Weekly	per Wage Earner	Tear and Month	Hourly	Weekly	per Wage Earner
1941							
January	\$ .689	\$27.71	39.0	May	1.042	46.02	44.1
February	.692	28.56	40.0	June	1.038	46.32	44.6
March	.697	29.11	40.4	July	1.033	45.45	44.0
April	.708	29.17	40.4	August	1.024	41.72	40.7
May	.726	30.78	40.8	September	.987	40.87	41.4
June	.738	31.88	41.3	October	.985 .991	40.97 40.82	41.6 41.2
***************************************	.744	31.22	40.3	November	.997	41.43	41.6
July	.745	31.66	41.0	December	.997	41.45	41.0
	.758	32.06	40.9	1946			
September	.770	32.89	41.1		61 004	C41 1E	41.0
October	.781	32.80	40.3	January	\$1.004 1.002	\$41.15 40.58	40.5
November	.787	33.69	41.2	February	1.002	42.15	40.7
December	.101	33.03	41.2	April	1.058	42.13	40.5
1010 Bill-outlier Aven	e 052	42C CE	42.9	May	1.071	42.51	39.7
1942 Monthly Avg		\$36.65		June	1.084	43.31	40.0
1943 Monthly Avg	.961	43.15	44.9	July	1.093	43.38	39.7
				August	1.112	44.99	40.5
1944				September	1.126	45.39	40.3
January	\$1.002	\$45.29	45.2	October	1.130	45.73	40.5
February	1.003	45.47	45.3	November	1.139	45.78	40.2
March	1.006	45.64	45.3	December	1.145	46.86	40.9
April	1.013	45.55	45.0				
May	1.017	46.02	45.3	1947			
June	1.017	46.24	45.4	January	\$1.161	\$47.10	40.6
July	1.018	45.43	44.6	February	1.170	47.29	40.4
August	1.016	45.88	45.2	March	1.180	47.69	40.4
September	1.032	46.24	44.8	April	1.186	47.50	40.0
October	1.031	46.94	45.5	May	1.207	48.44	40.1
November	1.035	46.86	45.3	June	1.226	49.33	40.2
December	1.040	47.45	45.6	July	1.230	48.98	39.8
5000111501				August	1.236	49.17	39.8
1945				September	1.249	50.43	40.4
January	\$1.046	\$47.50	45.4	October	1.257	50.98	40.5
February		47.37	45.4	November	1.266	51.02	40.3
March	1.044	47.40	45.4	December	*****		. 6.5.6
April		47.12	45.1	Source—Bureau of Labor Stat	intina		
				Comice Dureau of Labor Stat	151103.		

#### Employment, Earnings and Hours Worked-By Years

#### IN THE AUTOMOBILE INDUSTRY

#### IN ALL INDUSTRY

Year	Average Employment	Total Payrolls	Average Weekly Earnings	Average Hrs. Worked per Week	Year	Average Hourly Earnings	Average Weekly Earnings	Average Weekly Hours per Worker
1929 1930 1931 1932 1933 1934	341,000 302,000 257,000 257,000	\$ 788,892,000 464,880,000 377,520,000 273,832,000 270,556,000 467,480,000	\$32.20 26.20 24.00 21.22 20.81 23.24	46.8 39.9 36.9 31.2 35.1 33.2	1932 1933 1934 1935 1936	\$ .458 .455 .541 .559 .564	\$17.86 17.36 18.93 20.85 22.60	38.2 37.8 34.5 36.5 39.1
1935. 1936. 1937. 1938. 1939.	430,000 505,000 306.000 402.000	587,444,000 671,528,000 814,320,000 458,328,000 651,976,000 824,096,000	29.72 31.90 30.34 32.91	37.0 38.4 35.8 32.8 35.4 37.7	1937 1938 1939 1940	.634 .639 .644 .670	24.95 22.70 24.58 26.11 31.08	38.6 35.5 37.6 38.1 40.5
1941 1942 1943 1944 1945 1946	510,000 714,000 732,000 605,000 661,000	1,173,536,000 1,345,656,000 2,094,144,000 2,186,076,000 1,654,715,000 1,712,741,000 2,260,790,000	51.94 56.94 57,82 51.99 50.22	39.6 44.4 46.2 45.5 41.3 37.6 38.7	1942 1943 1944 1945 1946 1947 P	.853 .961 1.017 1.023 1.083 1.215	36.65 43.15 46.08 44.41 43.72 48.90	42.9 44.9 45.2 43.4 40.3 40.2

Bureau of Labor Statistics. Data cover motor vehicles, bodies and parts factories.

<sup>\*-</sup>Bureau of Labor Statistics.

P-Preliminary.

#### FEDERAL DEBT AND CORPORATE PROFITS

# Direct Debt of the U. S. Government

1947 Corporate Taxes Up \$2.7 Billion from 1946.

(Gross Debt in Thousands of Dollars)

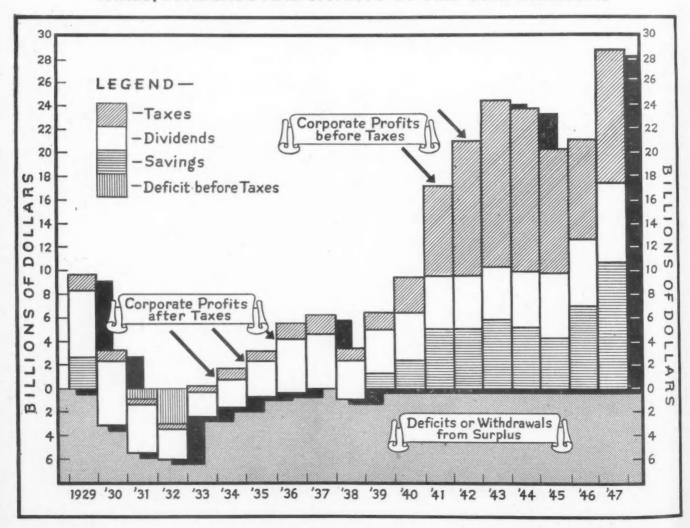
(Millions of Dollars)

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						1 101111110	III2 OI DE	mais!		
Year Ending June 30	Gross Debt	Debt per Capita				Corporate		Corporate		Undistrib-
1900	\$1,263,000	8 16.56						Profits		
1905	1,132,357	13.60				Profits				uted
1910	1.146.940	12.69				Before		After	Divi-	Corporate
1915	1,191,264	11.83				Taxes	Taxes	Taxes	dends	Profits
1916	1,225,146	11.96				at the same of the	2000			- AULIES
1917	2,975,619	28.57	1929			\$ 9,818	\$ 1,398	\$ 8,420	\$ 5,823	\$ 2,597
1918	12,243,629	115.65								
1919	25,482,034	240.09	1930			3,303	848	2,455	5,500	=3,045
1920	24,297,918	228.32	1931			-783	500	-1,283	4,098	=5.381
1021	23,976,251	221.09	1932			-3,042	382	-3,424	2,574	=5,998
1921	22,964,079	208.97	1933			162	524	-362	2,066	
1923	22,349,688	200.10								=2,428
1924	21,251,120	186.86	1934			1,723	746	977	2,596	=1,619
1925	20,516,272	177.82								
1926	19,643,183	167.70	1935			3,224	965	2,259	2,872	= 613
1927	18.510.174	156.04	1936			5.684	1,411	4,273	4,557	= 784
1928	17,604,291	146.69	1937							
1929	16.931.198	139.40				6,197	1,512	4,685	4,693	= 8
1930	16,185,308	131.49	1938			3,329	1,040	2,289	3,195	906
1931	16,801,485	135.37	1939			6,467	1,462	5,005	3,796	1,209
1932	19,487,010	155.93	1940			9,325	2,878	6,447	4,049	2,398
1933	22,538,672	179.21	1940			0,020	2,010	0,221	1,010	2,000
1934	27,053,086	213.65	10/1			17 000	7 040	0.200	1 10=	4.004
1935	28,701,167	225.07	1941			17,232	7,846	9,386	4,465	4,921
1936	33.545.385	261.20	1942			21,098	11,665	9,433	4,297	5,136
1937	36,427,091	281.82	1943			24,516	14,153	10,363	4,477	5,886
1938	37.167.487	285.43	1944			23,841	13,913	9,928	4,689	5,239
1939	40,445,417	308.34								
1940	42,971,044	325.66	1945			20,222	11,283	8,939	4,765	4,174
1941	48,978,919	367.68	1946			21,140	8,601	12,539	5,614	6,925
1942	72,495,183	540.88								-1
1943	136,696,000	1.007.64	1947	P		28,731	11,307	17,424	6,763	10,661
1944	201.003.000	1.456.00	2021			,	,,	/	2,,00	20,001
1945	258.862.000	1.854.00	_							
1946	269,422,000	1,910.00	_	-Deficit. =	= Withdra	wals from Si	urplus. P-P	reliminary Data	a.	
1947	258,286,000							of Commerce .		

TAXES, DIVIDENDS AND SAVINGS OF ALL CORPORATIONS



# The Automotive Industries Comprise 4453 Plants in 45 States

Because it was the scene of the beginning of quantity production of passenger cars and the major proportion of them are still built there, there is a tendency to think that automotive manufacturing activities are concentrated in the Detroit area. This misconception arises from a confusion of terms, in which the automobile industry is erroneously identified with the generic group of automotive industries of which it is a part.

In the entire country, in fact, only three States—Of the total 4453 manufacturing plants making up these industries, only 559, or 12.6 per cent, are located in the State of Michigan. Ohio, with 634, and Illinois, with 587, each contains a greater number of these plants than Michigan, and New York, with 534, is not far behind.

Montana, Nevada and New Mexico—have no automotive industrial manufacturing plants recorded in the Chilton Automotive Buyer's Guide.

Even from these three States the automotive industries purchase a large variety of materials—borax, carbon black, copper, cotton, flaxseed, graphite, hides, lead, magnesite, manganese, mercury, mica, mohair, molybdenum, soda, tungsten, vanadium and wool.

The automotive industries buy from every state in the U. S.

Their purchases cover some 1700 separate items, ranging from abrasives to zinc.

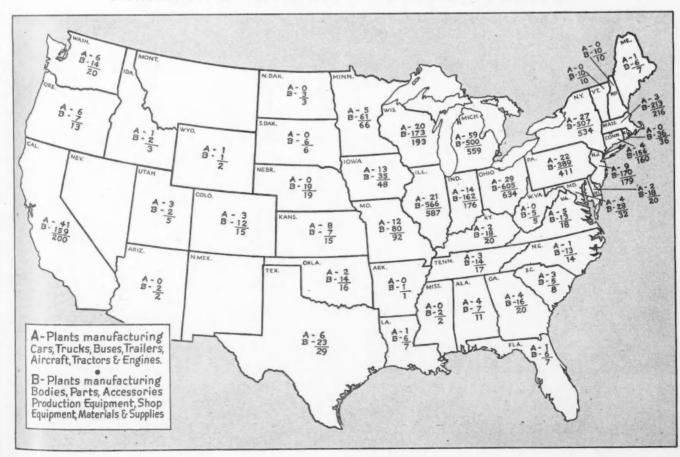
The following map, showing the distribution of the manufacturing plants of the automotive industries by states, was prepared from the records of Chilton Automotive Buyer's Guide.

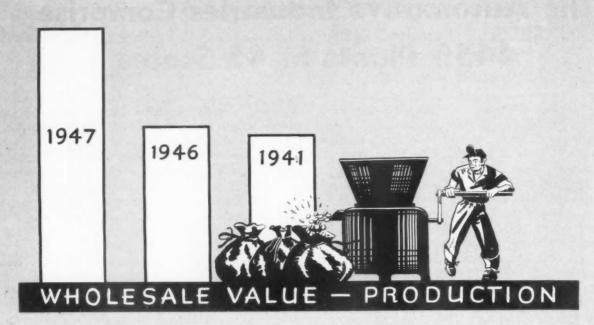
#### PRODUCTS OF THE AUTOMOTIVE INDUSTRIES

Passenger Cars Trucks Buses Tractors Aircraft Bodies Tires
Gasoline Engines
Diesel Engines
Marine Engines
Agricultural Machinery
Roadworking Machinery

Automotive Parts
Automotive Accessories
Petroleum Products
Automotive Production Equipment
Automotive Shop Equipment
Automotive Materials and Supplies

#### DISTRIBUTION OF PLANTS OF THE AUTOMOTIVE INDUSTRIES





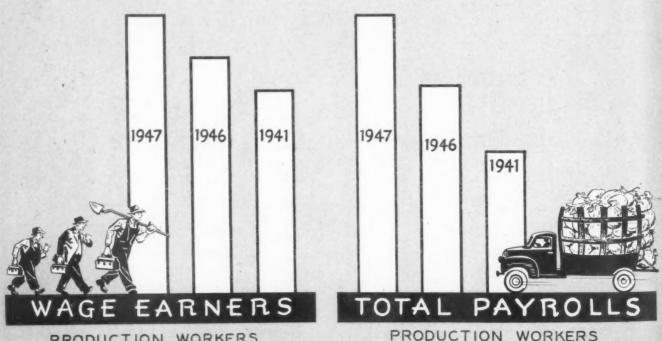
•1947• •1946• •1941•

CARS \$6,000,000,000 \$3,215,808,000 \$3,761,549,000

PARTS \$2,500,000,000 \$1,753,000,000 \$718,212,000

TOTAL \$8,500,000,000 \$4,968,808,000 \$4,479,761,000

# The Automobile Industry's 1947

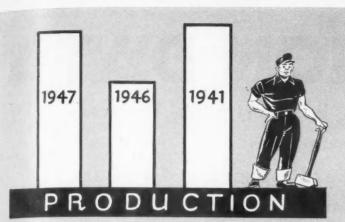


·1947·

PRODUCTION WORKERS
•1947 • 1946 • 1941 •
\$786,000 \$661,000 \$570,000

\$ 2,310,776,000 \$1,712,741,000 \$1,173,536,000

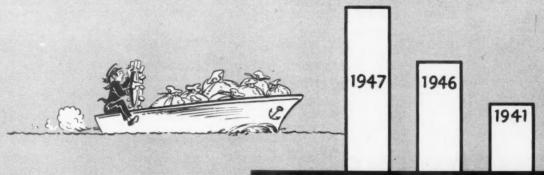
·1946 ·



\*1947 \* 1946 \* 1941 \* 1

# 1947 1946 1941 EXPORTS – NEW VEHICLES

•1947 • •1946 •1941 •194



Records · · ·

#### TOTAL EXPORTS - VALUE

ALL AUTOMOTIVE PRODUCTS

•1947•
•1946•
•1941•
\$1,299,680,000 \$642,344,000 \$400,288,000



\*\*\text{1947\*} \text{\*\*\text{1946\*}} \text{\*\*\text{1941\*}} \text{\*\*\text{CARS}} \text{30,669,329} \text{27,834,543} \text{29,240,417} \text{TRUCKS} \text{6,658,332} \text{5,858,813} \text{4,911,990} \text{TOTAL} \text{37,327,661} \text{33,693,356} \text{34,152,407}

#### **Motor Vehicle**

# PRODUCTION DATA

Passenger Cars, Trucks, Buses, Trailers, Tractors

#### 97 Million Motor Vehicles Produced in 48 Years

Factory Sales and Their Wholesale Value, U. S. Plants

	ENGER CARS			RUCKS AND B			OTAL
Number		Average	Number		Average	Number	
of	Whole-	Wholesale	of	Wholesale	Wholesale	of	Wholesale
YEAR Units	sale Value	Price	Units†	Value	Price	Units	Value
1900 4,912	\$ 4,899,443	\$997				4,192	\$4,889,443
1901 7,000	8,183,000	1169	*****			7,000	8,183,000
1902 9,000	10,395,000	1155	*****			9,000	10,395,000
1903 11,235	13,000,000	1157				11,235	13,000,000
1904 22,130	23,357,692	1055	700	\$1,272,747	\$1818	22,830	24,630,439
							24,050,459
1905 24,250	38,670,000	1594	750	1,330,000	1773	25,000	40,000,000
1906 33,200	61,460,000	1851	800	1,440,000	1800	34,000	62,900,000
1907 43,000	91,620,000	2131	1,000	1,780,000	1780	44,000	93,400,000
1908 63,500	135,250,000	2129	1,500	2,550,000	1700	65,000	137,800,000
1909 123,990	159,765,721	1288	3,297	5,333,683	1617	127,287	165,099,404
1910 181,000	215,340,000	1189	6,000	9,660,000	1610	187,000	225,000,000
1911 199,319	225,000,000	1128	10,681	21,000,000	1966	210,000	246,000,000
1912 356,000	335,000,000	941	22,000	43,000,000	1954	378,000	378,000,000
1913	399,902,000	866	23,500	44,000,000	1872	485,000	443,902,000
		768	24,900	44,219,096	1775		
1914 548,139	420,838,378		24,500	44,219,090	1110	573,039	465,057,474
1915 895,930	575,978,000	643	74,000	125,800,000	1700	969,930	701,778,000
1916 1,525,578	921,378,000	604	92,130	161,000,000	1747	1,617,708	1,082,378,000
1917 1,745,792	1,053,505,781	603	128,157	220,982,668	1724	1,873,949	1,274,488,449
1918 943 436	801,937,925	850	227,250	434,168,992	1910	1,170,686	1,236,106,917
1919 1,651,625	1,365,395,415		224,731	371,422,820	1652	1,876,356	1,736,818,235
1920 1,905,560	1,809,170,963	949	321,789	423,249,410	1315	2,227,349	2,232,420,373
1921 1,468,067	1,038,191,037	707	148,052	166,070,810	1122	1,616,119	1,204,261,847
1922 2,274,185	1,494,513,991	657	269,991	226,049,658	837	2,544,176	
1000 0 004 717	2,196,272,116	606	409,295	308,537,929	754	4,034,012	1,720,563,649
1923 3,624,717							2,504,810,045
1924 3,185,881	1,970,096,559	618	416,659	318,580,580	765	3,602,540	2,288,677,139
1925 3,735,171	2,458,370,026	658	530,659	458,400,277	864	4,265,830	2,916,770,303
1926 3,783,987	2,640,064,519	698	316,947	452,123,435	875	4,300,934	3,092,187,954
1927 2,936,533	2,164,670,891	737	464,793	420,130,624	904	3,401,326	2,584,801,515
1928 3,815,417	2,576,489,623	675	543,342	437,132,258	804	4,358,759	3,013,621,881
1929 4,587,400	2,847,118,562	621	771,020	566,029,644	734	5,358,420	3,413,148,206
1930 2,784,745	1,645,398,523	591	571,241	389,436,690	682	3,355,986	2,034,835,213
1931 1,973,090	1,111,273,774	563	416,648	262,417,542	630	2,389,738	1,373,691,316
1932 1,135,491	618,291,168	544	235,187	136,193,336	579	1,370,678	754,484,504
1933 1,573,512	762,736,512	485	346,545	186,069,314	537	1,920,057	948,805,826
1934 2,177,919	1,147,116,195	527	575,192	320,143,667	556	2,753,111	1,467,259,862
1935 3,252,244	1,709,425,904	526	694,690	379,407,751	546	3,946,934	2,088,833,655
1936	2,015,646,217	549	784,587	462,820,474	590	4,454,115	2,478,466,691
1937 3,915,889	2,304,349,252		893,085	542,921,096*	608	4,808,974	2,847,270,348*
1938 2,000,985	1,269,765,050	* 634	488,100	339,226,639*	695	2,489,085	1,608,991,689*
1939 2,866,796	1,816,434,914	* 634	710,496	502,421,776*	707	3,577,292	2,318,856,690*
1940 3,717,385	2,441,513,000	* 657	754,901	577,012,000*	764	4.472.286	3.018,525,000*
1941 3,779,682	2,673,957,000		1,060,820	1,087,592,000*	1025	4,840,502	3,761,549,000*
1942 222,862	174,083,000		818,662	1,436,162,000*	1754	1,041,524	1,610,245,000*
1943‡ 139			699,689	1,453,467,000*	F-1	699,828	1.453,576,000*
1944‡ 610			737,524	1,712,356,000*			1,712,832,000*
						738,134	
1945 69,532	60,603,000		655,683	1,219,957,000*	1861	725,215	1,280,560,000*
1946 2,148,699			940,851	1,090,885,000*	1159	3,089,550	3,215,808,000*
1947 P 3,558,118		*	1,239,469	*		4,797,587	********
						-	

Note: Table above includes sales of military vehicles. Prior to 1940 station wagons and other vehicles built on passenger car chassis are included with trucks. In 1940 and later years such vehicles built on passenger car chassis are included with passenger cars.

 $\dagger$  A substantial part of the trucks reported comprises chassis only, without bodies; hence, the value of bodies for these chassis are not included.

t Actual value of passenger car factory sales for 1943 and 1944 are not available. Value figures are approximations based on the average value per unit in 1942. While production of passenger cars ended in February, 1942, some vehicles remained in factory stocks to be sold under rationing orders in 1943 and 1944.

Feb

Mar

Oct

Jan Fel Ma Ap: Ma Jun Jul Au

<sup>•</sup> Includes Federal Excise Taxes and standard equipment.

P-Preliminary values.

# 1947 Motor-Vehicle Factory Sales to Domestic and Foreign Markets

# 1947 Factory Sales to Domestic and Foreign Markets From Plants Located in the U.S.

	Pa	ssenger Ca	rs —		- Trucks -		Buses		
	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
January	226,695	19,910	246,605	77,434	22,384	99,818	1,115	158	1,273
February	0.45 0.04	21,934	267,015	83,276	21,766	105,042	1,090	213	1,303
March		21,507	301,525	92,082	26,152	118,234	1,272	149	1,421
April		22,812	314,765	83,515	23,469	106,984	1,465	185	1,650
May		23,117	284,357	75,696	20,734	96,430	1,599	254	1,853
June	OOA ETC	22,548	307,124	73,613	18,007	91,620	1,409	219	1,628
July		21,750	279,631	78,444	19,311	97,755	1,694	112	1,806
August		20,800	261,158	66,382	20,104	86,486	1,570	195	1,765
September		22,352	307,942	89,724	20,996	110,720	1,413	195	1,608
October	000 000	20,870	315,969	94,307	24,058	118,365	1,527	140	1,667
November	004 720	20,418	305,148	71,161	16,450	87,611	1,142	275	1,417
December	011000	22,853	366,879	85,971	15,598	101,569	1,087	357	1,444
Total	3,297,247	260,871	3,558,118	971.605	249,029	1.220,634	16,383	2,452	18,835

# 1947 Motor Truck Factory Sales by Gross Vehicle Weights From Plants Located in the U.S.

#### TOTAL—DOMESTIC AND FOREIGN MARKET

					N MARKE	-		
	5,000 & Less	5,001- 10,000	10,001- 14,000	14,001- 16,000	16,001- 19,500	19,501- 26,000	Over 26,000	Total
January	30,024	12,358	24.035	24,769	3,773	2.632	2,227	99,818
February	30,175	14,801	24,862	27.265	2,863	2,940	2,136	105,042
March	32,695	17.864	26,006	32,020	3,688	3,724	2,237	118,234
April	30,280	17,212	25,642	23,331	4,178	3,895	2,446	106,984
May	29,894	15,355	23,304	18,664	2,388	3,497	2,328	96,430
June	25,837	11,917	23,688	20,413	3,684	3,434	2,647	91,620
	28,172	13,927	21,377	25,639	2,935	3,640	2,065	97,755
				22,754		3,492		86,486
August	25,049	11,247	19,475		2,618		1,851	110,720
September	37,539	17,951	23,101	22,783	3,355	3,831	2,160	
October	42,019	18,249	22,282	25,025	3,836	4,548	2,406	118,365
November	29,957	14,289	15,552	19,533	2,959	3,476	1,845	87,611
December	33,804	17,320	16,665	23,393	4,329	3,652	2,406	101,569
Total	375,445	182,490	265,989	285,589	41,606	42,761	26,754	1,220,634
		DOMES	TIC MAR	KET				
January	25,578	11,103	17,361	15,746	3,259	2,313	2,074	77,434
February	26,051	13,076	19,170	18,150	2,316	2,579	1,934	83,276
March	27,268	16,852	19,358	20,232	3,062	3,254	2,056	92,082
April	24,487	15,978	18,953	14,885	3,582	3,360	2,270	83.515
	23,532	14,091	17,474	13,028	2,577	2,950	2,044	75,696
	21,924	10,809	16,303	16,462	2,928	2,837	2,350	73,613
Y - 2								
	22,679	12,868	16,452	19,294	2,305	3,069	1,777	78,444
August	20,217	9,746	13,977	15,592	2,216	2,968	1,666	66,382
September	31,901	16,326	18,012	15,448	2,803	3,359	1,875	89,724
October	36,538	16,368	15,396	16,781	3,312	3,909	2,003	94,307
November	25,470	12,856	11,813	13,913	2,498	2,958	1,653	71,161
December	29,017	15,634	13,006	19,174	3,802	3,167	2,171	85,971
Total	314,662	165,707	197,275	198,705	34,660	36,723	23,873	971,605
		FOREI	GN MARK	ET				
January	4,446	1,255	6,674	9,023	514	319	153	22,384
February	4,124	1,725	5,692	9,115	547	361	202	21,766
March	5,427	1,012	6,648	11,788	626	470	181	26,152
April	5,793	1,234	6,689	8,446	596	535	176	23,469
May	6,362	1,264	5,830	5,636	811	547	284	20,734
June	3,913	1,108	7,385	3,951	756	597	297	18,007
July	5,493	1.059	4,925	6,345	630	571	288	19.311
August	4,832	1,501	5,498	7.162	402	524	185	20,104
September	5,638	1,625	5.089	7.335	552	472	285	20,996
October	5,481	1,881	6,886	8,244	524	639	403	24,058
November	4.487	1,433	3,739	5,620	461	518	192	16,450
December	4,787	1,686	3,659	4,219	527	485	235	15,598
Total	60,783	16,783	68,714	86,884	6,946	6,038	2,881	249,029

# Motor Vehicle Factory Sales – by Months From U.S. Plants

			PASSEN	GER CARS				
Month	1947	1946	1941	1940	1939	1938	1937	1936
January	246,605	56,367	413,012	363,120	281,465	155,505	309,494	297,692
February	267,015	57,784	397,067	339,595	243,000	139,380	296,788	224,211
March	301,525	85,813	416,016	356,351	299,703	174,065	403,879	342,870
April	314,765	132,631	378,906	364,096	273,409	176,078	439,980	416,431
May	284,357	166,942	421,631	327,873	237,870	154,958	425,432	384,921
June	307,124	141,090	423,008	289,228	246,704	136,531	411,414	375,337
July	279,631	209,183	347,907	174,218	150,738	106,841	360,400	371,922
August	261,158	247,250	79,343	47,804	61,407	58,624	311,456	209,351
September	307,942	232,280	166,397	223,593	161,625	65,159	118,671	90,101
October	315,969	283,597	296,554	421,777	251,819	187,494	298,662	190,242
November	305,148	269,081	259,631	408,817	285,252	320,344	295,328	341,085
December		266,681	180,210	400,913	373,804	326,006	244,385	425,365
Total	3,558,118	2,148,699	3,779,682	3,717,385	2,866,796	2,000,985	3,915,889	3,669,528
				AND BUSSE				
Month	1947	1946	1941	1940	1939	1938	1937	1936
January	101,091	45,480	86,346	68,356	60,703	53,823	70,109	66,250
February	106,345	35,278	87,824	63,709	60,220	47,151	67,405	63,331
March	119,655	38,193	94,106	68,260	72,243	47,580	90,242	78,052
April	108,634	81,740	85,395	67,764	63,996	43,032	96,170	86,243
May	98,283	76,162	97,115	63,255	59,672	37,101	91,487	75,591
June	93,248	60,812	97,884	56,562	63,034	38,139	85,898	77,631
July		88,453	97,877	62,187	58,621	34,602	78,568	68,809
August	88,251	98,948	65,383	28,995	38,461	31,870	82,874	61,923
September	112,328	96,515	68,460	44,147	27,132	18,375	52,542	45,064
October	120,032	108,141	81,478	70,447	61,573	22,018	31,214	34,446
November	89,028	102,075	93,128	76,841	66,533	52,069	64,727	53,902
December		109,054	105,734	84,378	78,338	62,340	81,849	73,345
Total	1,239,469	940,851	1,060,820	754,901	710,496	488,100	893,085	784,587
**				TOR VEHIC		4000		
Month	1947	1946	1941	1940	1939	1938	1937	1936
January	347,696	101,847	499,448	431,476	342,168	209,328	379,603	363,942
February	373,360	93,062	484,891	403,304	303,220	186,531	364,193	287,542
March	421,180	124,006	510,122	424,611	371,946	221,645	494,121	420,922
April	423,399	214,371	464,301	431,860	337,375	219,110	536,150	502,674
May	382,640	243,104	518,746	391,128	297,542	192,059	516,919	460,512
June	400,372	201,902	520,892	345,790	309,738	174,670	497,312	452,968
July	379,192	297,636	445,784	236,405	209,359	141,443	438,968	440,731
August	349,409	346,198	144,726	76,799	99,868	90,494	394,330	271,274
September	420,270	328,795	234,857	267,740	188,757	83,534	171,213	135,165
October	436,001	391,738	378,032	492,224	313,392	209,512	329,876	224,688
November		371,156	352,759	485,658	351,785	372,413	360,055	394,987
December	469,892	375,735	285,944	485,291	452,142	388,346	326,234	498,710
Total	4,797,587	3,089,550	4,840,502	4,472,286	3,577,292	2,489,085	4,808,974	4,454,115

<sup>\*</sup> U. S. Census Bureau and Automobile Manufacturers Association. No monthly factory sales are available for years 1942-1945,

# Factory Sales to Domestic and Foreign Markets From Plants Located in United States

	PASSENGER CARS					MOTOR TRUCKS*				TOTAL MOTOR VEHICLES-			
	Total	Domestic Market	Foreign Market	Per Cent Foreign	Total	Domestic Market		Per Cent Foreign	Total	Domestic Market	Foreign Market	Per Cent Foreign	
1925	3.735.171	3,419,072	316.099	8 5	530,659	418,064	112,595	21.2	4,265,830	3.837.136	428,694	10.0	
1926	3,783,987	3,494,791	289,196	7.6	516,947	413,080	103,867	20.1	4,300,934	3,907,871	393,063	9.1	
1927	2,936,533	2,604,491	332,042	11.3	464,793	330,455	134.338	29.0	3,401,326	2.934.946	466,380	13.7	
1928	3,815,417	3,396,516	418,901	11.0	543,342	379,530	163,812	30.1	4,358,759	3,776,046	582,713	13.4	
1929	4,587,400	4,136,305	451.095	9.8	771,020	488,353	282,667	36.7	5,358,420	4,624,658	733,762	13.7	
1930	2,784,745	2,536,981	247,764	8.9	571,241	413,290	157,951	10.1	3,355,986	2,950,271	405,715	12.1	
1931	1,973,090	1.838.786	134,304	6.8	416,648	309,029	107.619	25.8	2,389,738	2,147,815	241.923	10.1	
1932	1,135,491	1,062,376	73,115	6.4	235,187	187,837	47,350	20.1	1,370,678	1,250,213	120,465	8.8	
1933	1,573,512	1.475.357	98,155	6.2	346.545	268,117	78,428	22.6	1.920.057	1.743.474	176.583	9.2	
1934	2,177,919	1,993,763	184,156	8.4	575,192	448.826	126,366	22.0	2,753,111	2,442,589	310,522	11.3	
1935	3,252,244	3,041,877	210,367	6.5	694,690	570,216	124,474	17.9	3,946,934	3,612,093	334.841	8.5	
1936	3,669,528	3,458,051	211,477	5.8	784,587	649,997	134,590	17.2	4,454,115	4,108,048	346,067	7.8	
1937	3,915,889	3,643,386	272,503	6.9	893,085	689,674	203,411	22.8	4,808,974	4,333,060	475,914	9.9	
1938	2,000,985	1,810,938	190,047	9.5	488,100	352,207	135,893	27.8	2,489,085	2,163,145	325,940	13.1	
1939	2,866,796	2,702,181	164,615	5.7	710,496	558,973	151,523	21.3	3,577,292	3,261,154	316,138	8.8	
1940	3,717,385	3,608,042	109,343	2.9	692,791	599,912	92,879	13.4	4,410,176	4,207,954	202,222	4.6	
1941	3,779,682	3,681,558	98,124	2.6	869,940	749,163	120,777	13.9	4,649,622	4,430,721	218,901	4.7	
1942	222,862	215,779	7.083	3.2	184,985	164,325	20,660	11.2	407,847	380,104	27,743	6.8	
1943	139	121	18	***	24.842	23,420	1,422	5.7	24,981	23,541	1,440	5.8	
1944	610	308	302		116,167	102,295	13,872	11.9	116,777	102,603	14,174	12.1	
1945	69,532	68,093	1,439	2.1	291,469	254,039	37,430	12.8	361.001	322,132	38,869	10.7	
1946	2,148,699	2,004,649	144.050	6.7	940,851	753,830	187,021	19.9	3,089,550	2,758,479	331.071	10.7	
1947	3,558,118	3,297,247	260,871	7.3	,239,469	987,988	251,481	20.3	4,797,587	4,285,235	512,352	10.7	

<sup>\*</sup> Does not include military trucks for 1940 through 1945. Source:—Department of Commerce through 1939. Automobile Manufacturers Association for subsequent years.

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#### Motor Vehicle Production in Canada†

Number of Units and Their Wholesale Value

		-Passenger Cars			— Trucks —		Total	
Year	Number of Units	Wholesale Value	Average Wholesale Value	Number of Units	Wholesale Value	Average Wholesale Value	Number of Units	Wholesale Value
1921	61,098	\$53,561,415	\$876	5,148	\$3,843,288	\$746	66,246	\$57,404,703
1922	00,000	67,226,654	724	8,169	5,232,405	640	101,007	72,459,059
1923		78,282,372	612	19,226	8,941,011	465	147,202	87,223,383
1924		70,609,960	616	18,043	8,125,916	450	132,580	78,735,876
1925		86,158,773	635	26,397	12,234,486	463	161,970	98,393,259
1926	166,887	106,000,203	635	37,840	16,629,334	439	204,727	122,629,537
1927		100,962,211	689	32,633	14,942,017	458	179,054	115,904,228
1928	405040	127,263,877	643	44,206	21,913,122	496	242,054	149,176,999
1929	000 000	134,023,280	659	59,318	29,474,395	497	262,625	163,497,675
1930	404 005	75,253,581	620	32,035	16,513,225	515	153,372	91,766,806
1931	65,072	42,634,173	655	17,487	10,330,763	591	82,559	52,964,936
1932	50,694	32,490,129	641	10,095	6,070,667	601	60,789	38,560,796
1933	53,849	32,568,268	605	12,003	6,062,195	505	65,852	38,630,463
1934		57,260,156	618	24,205	12,770,318	528	116,852	70,030,474
1935		79,209,276	584	37,315	19,803,771	531	172,877	99,013,047
1936	128,369	76,814,258	598	33,790	19,140,946	566	162,159	95,955,204
1937	153,046	93,368,282	610	54,417	30,389,011	558	207,463	123,757,293
1938	123,761	81,661,687	660	42,325	26,497,038	626	166,086	108,158,725
1939	108,369	71,101,204	656	47,057	28,072,712	597	155,426	99,173,916
1940	109,911	83,544,445	760	113,102	91,191,516	806	223,013	174,735,961
1941		81,167,694	840	173,588	163,414,253	941	270,191	244,581,947
1942	12,236	10,305,013	842	216,057	229,103,128	1060	228,293	239,408,141
1943		- No production		178,064	222,393,092	1249	178,064	222,393,092
1944		<ul> <li>No production</li> </ul>		158,038	213,259,582	1349	158,038	213,259,582
1945	1,868	1,638,118	877	130,777	167,103,012	1278	132,645	168,741,130
1946		82,847,330	902	79,657	81,204,338	1019	171,528	164,051,668
1947	167,270	*******		90,362			257,632	

#### 1946 Canadian Motor Vehicle Registrations—by Provinces\*

Province	Passenger Cars	Popula- tion per Pas- senger Car	Trucks	Buses	Other Motor Vehicles‡	Total Motor Vehicles	Popula- tion per Motor Vehicle	Motor-cycles	Trail- ers
P. E. Island	7,134	13.2	1,817	28	168	9,147	10.2	45	473
Nova Scotia	42,791	14.3	17.626	346	1,312	62,075	9.8	585	2,202
New Brunswick		15.7	11,102	268	2,286	44,326	10.7	328	2,263
Quebec	105 500	19.3	56,504	2,405	5,013	251,648	14.2	3,524	15,448
Ontario		7.0	116,305	2,215		704,124	5.8	6,982	61,114
Manitoba		9.9	25,391	149	718	100,234	7.4	856	8,315
Saskatchewan	100,905	8.2	46,285	67	154	147,411	5.6	795	7,700
Alberta	95,764	8.4	41,144	287	679	137,874	5.8	994	352
British Columbia	109,077	9.2	38,119	+		147,196	6.7	3,038	8,178
Yukon	359	22.3	802	23	81	1,265	6.2	16	
Total—Canada	1,234,006	10.0	355,095	5,788	10,411	1,605,300	7.6	17,163	106,045

<sup>†</sup> Included with trucks. ‡ Includes road tractors, ambulances, fire trucks, hearses, government and municipal vehicles. • Canadian Automobile Chamber of Commerce, 1947 Edition Facts and Figures.

# Integral Bus Production From Plants Located in the United States

	1947	1946	1944	1943	1942	1941	1940
January	1.273	447	231	227	901	430	467
February	1.303	285	245	226	828	456	454
March	1,421	527	336	102	929	662	405
April	1,650	948	352	76	875	603	338
May	1.853	789	367	33	938	701	531
June	1.628	774	293	54	875	609	458
July	1,806	862	381	15	879	650	406
August	1,765	1.067	470	48	263	627	688
September	1,608	833	563	145	557	748	403
October	1,667	975	594	162	376	615	685
November	1,417	1,146	484	199	419	573	591
December	1,444	1,438	1,483	326	497	952	721
Total	18,835	10,091	5,799	1,613	8,337	7,626	6,147

#### Truck Trailer Production\*

Type of Trailer 1947	1946
Vans	
Insulated and Refrigerated 1,853 Furniture	3,384 1,652
All Other Closed Top 18,783 Open Top	27,586 2,029
Total—Vans 23,251	34,651
Platforms	
With Cattle and Stake	
Racks	8,183
All Other 7,871	11,762
Total—Platform12,443	19,945
Tanks	
Petroleum 2,437 All Other 865	1,799 827
Total—Tanks 3,302	2,626
Pole and Logging Single Axle 4,103	5.970
Tandem Axle 1,545	1,598
Total — Pole and	
Logging 5,648	7,568
Low-bed Heavy Haulers 2,418	1,976
Off-highway 808	619
Dump Trailers 617	697
All Other Trailers 1,464	2,537
Total—Trailers 49,951	70,619
Chassis for Trailers 3,161	5,615
Total—Trailers and Chassis	50.004
[ nagging 53 119	10.234

# Truck Trailer Shipments - by Months In Units and Their Value

		1947	1	946
S	hipments	Value	Shipments	Value
January	5,781	\$12,253,522	4,592	\$ 9,130,505
February	5,988	13,652,252	4,591	9,388,793
March	6,744	15,861,787	5,389	10,391,030
April	5,123	12,691,288	5,730	11,482,854
May		11,270,344	5,832	12,423,853
June	0 0 1 0	9,919,483	6,279	12,854,829
July	3,347	8,697,635	5,555	11,153,809
August	3,724	10,114,765	7,046	13,994,222
September	3,948	10,469,130	6,207	12,594,963
October	4,605	11,952,284	8,374	17,960,242
November	3,969	10,642,563	7,268	15,897,637
December	3,906	10,879,562	6,138	14,111,326
Total	55,516	\$138,404,615	73,001	\$151,384,063

Industry Division, Bureau of the Census.

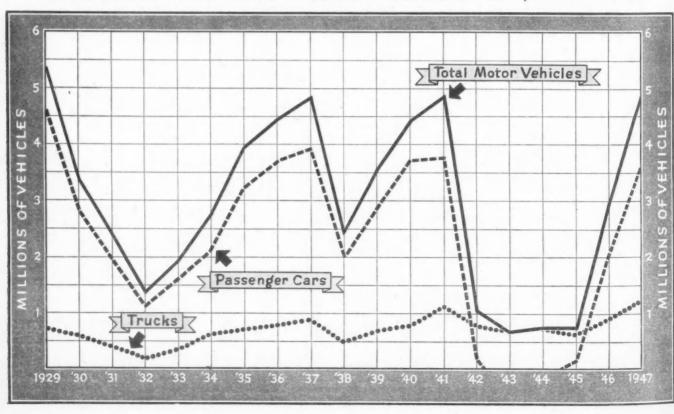
#### **Shipments of Housing Type Trailers**

Shown in Number of Units Shipped and Their Value

	1	946	1947				
	Shipments	Value	Shipments	Value			
January	2,491	\$3,224,098	5,042	\$8,287,711			
February		3,281,855	4,549	7,398,114			
March		3,899,281	4,819	7,664,976			
April	2,984	4,423,039	5,470	8,682,555			
May		5,100,519	5,806	9,324,548			
June		5,625,719	6,205	10,032,503			
July	3,902	6,203,092	6,078	9,814,500			
August		7,661,914	6,523	10,859,515			
September		7,865,126	6,925	11,634,920			
October	W 0 40	9,779,385	7,716	13,251,930			
November		9,246,394	5.847	10,001,422			
December	4,867	8,274,001	5,098	8,788,434			
Total	47,103	\$74,584,423	70,078	\$115,741,128			

\*—Industry Division, Bureau of the Census.

#### PASSENGER CAR AND TRUCK PRODUCTION, 1929-1947



Census.

#### Civilian Trailer Production, 1939-1941 and 1944\*

	19	39	19	40	19	941	1944		
Body Type	Number	Per Cent of Total							
General Freight†	18,144	75.04	19.693	72.63	30,837	73.65	19,822	82.28	
Low-Bed Heavy Haulers		3.52	1.023	3.77	1.205	2.88	256	1.06	
Pole, Pipe and Logging		11.95	3,728	13.75	5,837	13.95	2,100	8.72	
Dumps (All Types)	806	3.33	728	2.68	1,392	3.32			
Petroleum Tanks		5.16	1,652	6.09	2,239	5.35	1,003	4.16	
Milk Tanks		.57	147	.54	182	.43	245	1.02	
Miscellaneous Tanks‡	103	.43	147	.54	177	.42	666	2.76	
Total	24,182	100.00	27,118	100.00	41,869	100.00	24,092	100.00	

<sup>\*—</sup>Covers exclusively the highway civilian-type truck trailers and does not include those trailers with a rated tonnage capacity under 5 tons and those produced on direct military contract. Therefore, not directly comparable with civilian production data for 1942, 1943, 1944 and 1945, f—Includes vans, express rack, platform, stake, panel and special purpose type body.

—For asphalt, chemicals and other types not elsewhere specified.

#### Truck Trailer Production, 1942-1945\*

Civilian and Military

		1942			1943			1944		1945				
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total		
anuary	1,387	2,023	3,410	556	11,785	12,341	765	32,316	33,081	2,861	12,568	15,429		
ebruary	946	1,738	2,684	925	8,767	9,692	1,035	30,718	31,753	2,251	13,314	15,565		
arch	1.245	2,197	3,442	430	10,915	11,345	802	25,997	26,799	2,151	14,330	16,481		
pril	936	3,221	4.157	567	11,471	12,038	1,124	12,886	14,010	1,997	13,629	15,626		
[ay	1,151	4,385	5,536	611	10,487	11,098	2,592	12,089	14,681	1,854	15,084	16,938		
une	1,318	4,814	6,132	1,267	14,941	16,208	1,750	9,698	11,448	2,735	15,042	17,777		
uly	411	4,741	5,152	698	16,866	17,564	1,624	7,162	8.786	2,422	n.a.	n.a.		
ugust	294	8,861	9,155	792	16,772	17,564	1,397	9,046	10,443	2,565	n.a.	n.a.		
eptember	227	10.614	10,841	477	19,811	20,288	4.447	9,591	14,038	2,984	n.a.	n.a.		
etober	259	8,170	8,429	420	21,456	21,876	3,185	11,445	14,630	3,803	n.a.	n.a		
November	138	10,045	10,183	518	22,264	22,782	2,523	11,540	14,063	3,873	n.a.	n.a.		
December	96	10,711	10,807	793	23,276	24,069	2,848	12,861	15,709	3,770	n.a.	n.a.		
Total	8,408	71,520	79,928	8,054	188,811	196,865	24,092	185,349	209,441	33,266	83,967‡	97,816		

#### Truck Production By Capacities, 1936-1945\*

By Plants Located in the United States

Year	LIGHT		1	MEDIUM			HEAVY		TOTAL-ALL WEIGHTS			
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
1936 1937 1938 1939 1940 1941 1942 1943 1944	317,189 396,326 208,575 306,098 337,983 367,467 23,427 0	1,004 368 690 1,651 13,365 72,164 277,413 268,438 247,113 132,574	318,193 396,694 209,265 307,749 351,348 439,631 300,840 268,438 247,113 204,771	417,395 437,525 248,886 343,190 323,088 408,367 86,072 179 87,990 183,948	1,125 1,266 1,119 2,900 36,042 128,170 169,188 154,808 87,380 24,232	418,520 438,791 250,005 346,090 359,130 536,537 255,260 154,987 175,370 208,180	36,045 38,267 20,846 36,008 39,030 47,371 15,795 2,709 31,091 57,498	596 69 439 1,637 5,982 18,323 225,032 249,368 290,176 198,129	36,641 38,336 21,285 37,645 45,012 65,694 240,827 252,077 321,267 255,627	770,629 872,118 478,307 685,296 700,101 823,205 125,294 2,888 119,081 313,643	2,725 1,703 2,248 6,188 55,389 218,657 671,633 672,614 624,669 354,935	773,354 873,821 480,555 691,484 755,490 1,041,862 796,927 675,502 743,750 668,578

<sup>\*-</sup>War Production Board and Civilian Production Administration.

#### 1946 Motor Truck Factory Sales by Gross Vehicle Weights\*

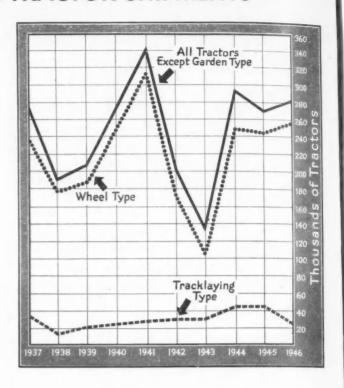
		From P	lants Located	in the United	States			
Month	5,000- & less	5,001- 10,000	10,001- 14,000	14,001- 16,000	16,001- 19,500	19,501- 26,000	Over 26,000	Total
January	18,535	3,877	9,058	8,499	1,646	2,136	1,282	45,033
February	13,758	3,100	9,436	4.624	1,230	1,760	1.085	34,933
March	16,821	2,002	8,451	7,791	441	1,223	937	37,666
April	26,925	5,013	29,795	14,669	1,720	1,691	958	80,771
May	26,209	5,833	22,884	15,635	2,002	1,729	1,081	75,373
June	32,890	4,795	12,754	5,555	1,556	1,469	1,019	60,038
July	30,618	7,125	23,209	21,633	2,301	1,791	914	87,591
August	34,987	6,744	28,281	23,189	1,853	1,858	969	97,881
September	32,605	9,188	28,687	20,074	2,066	2,076	986	95,682
October	35,933	14,745	26,659	21,754	3,082	3,387	1,606	107,166
November	30,520	12,424	22,971	27,438	3,377	2,878	1,321	100,929
December	30,929	13,389	25,727	29,713	2,888	3,254	1,716	107,616
Total	330,730	88,235	247,912	200,574	24,162	25,252	13,874	930,739

<sup>\*-1946</sup> data not comparable with data for years 1936 through 1945. Material for 1946 represents factory sales as supplied by the Automobile Manufacturers Association whereas production is shown for years 1936 through 1945.

#### FARM AND NON-FARM TRACTOR SHIPMENTS

# Tractor Factory Sales — by Years In Units and Their Wholesale Value

Year	WHEEL Number	TYPE Value at Factory	Average Value per Tractor
1938	175,473	\$118,060,604	\$673
1939	185,321	111,178,377	600
1940	249,921	137,178,844	549
1941	324,062	191,128,659	590
1942	185,677	111,618,126	601
1943	103,867	63,216,811	609
1944	249,955	170,112,908	680
1945	243,692	168,895,732	693
1946	255,338	183,689,863	719
1947	420,004	342,568,000	815
	TRACKLAY	ING TYPE	
1938	19,801	\$40,221,557	\$2,031
1939	21,104	45,803,981	2,170
1940	25,110	60,285,160	2,400
1941	29,744	80,063,902	2,692
1942	28,644	100,369,913	3,504
1943	30,652	142,194,327	4,639
1944	45,187	260,582,975	5,766
1945	43,998	212,007,480	4,818
1946	26,265	80,074,149	3,049
1947Industry	37,607 Division, Bures	134,215,000 au of the Census.	3,568



1898

190

191

191

#### Tractor Factory Sales by Hp Ratings

#### In Units and Their Value

	1	947	1	946		1945
	Number	Value	Number	Value	Number	Value
Wheel Type						
All Purpose						
Under 25 Belt Hp.		********	170,858	\$105,726,559	139,719	\$ 78,866,329
25-34 Belt Hp.		********	41,589	36,590,376	(1)	(1)
35 Belt Hp. and over		******	5,740	6,768,236	56,643	48,311,279
Other						
Under 25 Belt Hp.			16,293	10,922,663	17,861	11,196,645
25-34 Belt Hp		********	8,080	7,080,494	11,792	9,671,469
35 Belt Hp. and over		********	12,778	16,601,535	17,677	20,850,010
Total—Wheel Type	420,004	\$342,568,000	255,338	\$183,689,863	243,692	\$168,895,732
Under 35 Drawbar Hp.			8,197	\$ 12,015,008	7.214	\$ 8,666,660
35-49 Drawbar Hp			6.918	16,412,726	11.125	25,834,729
50-69 Drawbar Hp.			4,703	16,665,236	7,871	27,756,136
70 and over Drawbar Hp			6,447	34,981,179	17,788	149,749,955
Total—Tracklaying Type	37.607	\$134,215,000	26.265	\$ 80,074,149	43,998	\$212,007,480
Total—Wheel and Tracklaying Types. (1)—Included with 35 Belt Hp. and over. Source:—Industry Division, Bureau of the	457,611	\$476,783,000	281,603	\$263,764,012	287,690	\$380,903,212

#### Canadian Monthly Motor Vehicle Production

	1946	1945	1944	1943	1942
January	8.495	13.745	13.702	16.341	22.644
		,			and the second
February	7,484	13,090	13,930	15,998	20,181
March	11,373	14,912	14,625	17,687	20,188
April	16,830	14,351	11,061	15,500	19,549
May	20,022	15,045	12,303	15,689	17,141
June	15,585	14,532	14,317	15,164	21,050
July	17,221	11,093	12,132	11,598	18,672
August	12,293	13,376	13,729	15,046	18,042
September	11,543	8,484	12,511	13,122	18,094
October	14,951	6,596	13,230	13,827	19,477
November	19,105	1,575	14,047	14,186	15,051
December	16,626	5,846	12,451	13,906	18,204
Total	171,528	132,645	158,038	178,064	228,293

Source:-Canadian Automobile Chamber of Commerce.

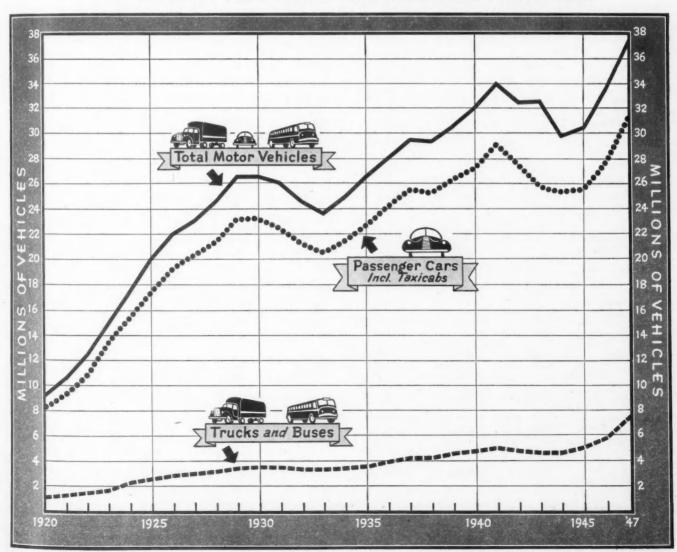
#### Total U. S. Motor Vehicle Registrations by Years

Showing Percentage Increases and Decreases

	Passenger		Total Motor			Passenge		<b>Total Motor</b>	Per Cent
Year	Cars	Buses	Vehicles	Increase	Year	Cars	Buses	Vehicles	Increase
1898	 800		800			13,479,608	1,612,569	15,092,177	23
1899	 3,200	* * * * * *	3,200		1924	15,460,649	2,134,724	17,595,373	17
1900	 8,000		8,000		1925	17,496,420	2,440,854	19,937,274	13
1901	 14,800	* * * * * *	14,800		1926	19,237,171	2,764,222	22,001,393	10
1902	 23,000		23,000		1927	20,219,224	2,924,019	23,133,243	5
1903	 32,920	* * * * * *	32,920		1928	21,379,128	3,113,999	24,493,124	6
1904	 54,590	410	55,000		1929	23,121,589	3,379,854	26,501,443	8
1905	 77,400	600	78,000	42	1930	23,183,243	3,473,831	26,657,072	0.2
1906	 105,900	1,100	107,000	37	1931*	22,567,383	3,426,515	25,993,896	-2.5
1907	 140,300	1,700	142,000	33	1932*	21,139,092	3,202,730	24,341,822	-6.4
1908	 194,400	3,100	197,500	39	1933*	20,557,493	3,292,439	23,849,932	-2.0
1909	 305,950	6,050	312,000	58	1934*	21,535,199	3,346,268	24,881,467	4.3
	 458,500	10,000	468,500	50	1935*	22,630,71	3,595,042	26,225,757	5.2
1911	 619,500	20,000	639,500	36	1936*	24,161,820	3,929,889	28,091,709	7.2
1912	 902,600	41,400	944,000	48	1937*	25,476,780	4,172,484	29,649,270	5.6
1913	 1,194,161	63,800	1,258,062	33	1938*	25,264,589	4,153,389	29,417,978	-0.8
1914	 1,625,739	85,600	1,711,339	36	1939*	26,147,79	4,496,770	30,644,568	4.2
1915	 2,309,666	136,000	2,445,666	43	1940*	27,240,47	4,683,376	31,923,851	4.2
1916	 2,297,996	215,000	3,512,996	44	1941*	29,240,41	7 4,911,990	34,152,407	7.0
1917	 4,657,340	326,000	4,983,340	42	1942*	27,683,52	4,741,298	32,424,827	-5.1
1918	 5,621,617	525,000	6,146,617	23	1943*	25,841,21	4,657,882	30,499,097	-6.0
1919	 6,771,074	794,372	7,565,446	23	1944*	25,298,63	4,611,966	29,910,605	-2.0
1920	 8,225,859	1,006,082	9,231,941	22	1945*	25,398,82		30,424,057	1.7
1921	 9,346,195	1,118,520	10,464,715	13	1946*	27,834,54	5,858,813	33,693,356	11.0
1922	 10,864,128	1,375,725	12,239,853	17	1947*	30,669,32	6,658,332	37,327,661	11.2

\*-Automotive Industries count, all others Bureau of Public Roads.

#### 1947 CAR AND TRUCK REGISTRATIONS REACH NEW PEAK



# 1947 Motor-Vehicle Registrations

## 1947 Registration Increase

Total U. S. Motor-Vehicle Registrations,

AS OF THE END OF

TH

	PASSENGE	R CARS (1)	TRU	JCKS	BUS	ES	MOTOR V	
STATES	1947	1946	1947	1946	1947	1946	1947	1946
AlabamaArizona Arizona Arkansas California ( <sup>7</sup> ) Colorado	331,056 140,230 239,852 2,775,173 (4) 325,472	296,604 123,844 222,579 2,505,002 ( <sup>4</sup> ) 301,622	108,251 41,000 111,112 461,315 101,953	86,441 35,044 94,450 406,729 90,543	1,976 700 2,357 (6) (6)	1,823 841 1,014 6,453 ( <sup>6</sup> )	441,283 181,930 353,321 3,236,488 ( <sup>5</sup> ) 427,425	384,868 159,729 318,043 2,918,184 392,165
Connecticut Delaware Dist. of Columbia Florida Georgia	493,600 61,154 136,524 560,000 499,631	452,886 56,690 111,156 483,585 450,148	77,093 15,913 15,588 136,000 150,108	75,266 14,296 14,495 120,525 126,403	2,567 ( <sup>6</sup> ) 2,331 4,000 5,076	2,304 ( <sup>6</sup> ) 2,114 3,699 4,771	573,260 77,067 154,443 700,000 654,815	530,456 70,986 127,765 607,809 581,322
daho. Ilinois ndiana lowa. Kansas	139,902 2,070,000 952,595 674,615 535,637	123,995 1,614,086 897,465 621,971 504,831	51,137 312,500 183,456 133,868 167,366	40,000 253,385 163,859 115,984 147,296	8,148 (6) (6)	(6) (6) <b>7,818</b> (6) (6)	191,529 2,382,385 1,144,199 808,483 703,003	163,999 1,867,47 1,069,14 737,959 652,12
Kentucky Louisiana Maine Maryland Massachusetts	408,000 360,898 177,967 434,621 890,128	386,920 333,214 171,919 428,201 835,428	110,000 113,177 61,001 86,000 144,113	101,541 98,117 56,769 81,649 131,071	3,471 472 1,900 5,794	3,433 444 1,810 5,782	518,000 477,546 239,440 522,521 1,040,035	488,46 434,76 229,13 511,66 972,28
Michigan Minnesota Mississippi Missouri Montana	727,319	1,404,082 673,246 218,723 776,771 120,102	220,974 148,644 109,103 212,000 63,871	194,546 130,946 95,536 188,394 54,947	(6) 488 3,629	(6) 402 4,668	1,824,587 876,451 334,730 1,046,900 195,654	1,598,62 804,59 318,92 965,16 175,04
Nebraska Nevada New Hampshire New Jersey New Mexico	112,057 1,025,160	351,048 38,717 108,351 943,095 95,864	91,000 12,595 31,227 186,939 41,000	87,121 10,778 28,872 167,506 35,179	750 (6) (6) 6,948 882	638 (6) (6) 10,429 (3) 1,900	472,350 56,508 143,284 1,219,047 155,882	438,80 49,49 137,22 1,121,03 132,94
New York North Carolina North Dakota Ohio Oklahoma	610,708 152,318 1,910,221	2,233,887 553,691 138,953 1,850,097 427,036	396,368 146,503 60,777 261,508 143,533	370,709 123,748 53,868 242,603 128,124	11,363 2,957 213 3,555	10,510 2,883 268 3,344 5,643	2,862,347 760,168 213,308 2,175,284 612,790	2,615,10 680,32 193,08 2,096,04 560,80
Oregon Pennsylvania Rhode Island South Carolina South Dakota	2,054,000 178,041 327,616	360,168 1,869,880 167,488 299,211 150,471	115,845 388,711 28,036 80,296 50,703	99,025 342,172 26,959 64,158 42,163	1,640 12,435 (3) 682 2,832 238	1,466 10,517 (3) 688 2,760 233	522,500 2,455,146 206,759 410,744 218,852	460,65 2,222,56 195,13 366,12 192,86
Tennessee Texas Utah Vermont Virginia		415,953 1,439,361 139,402 88,084 479,218	119,000 450,000 35,487 14,894 132,413	99,517 379,158 31,267 13,570 116,084	2,500 553 174 1,970	2,017 339 176 2,477	588,000 2,052,500 183,831 108,119 664,838	515,47 1,820,53 171,00 101,83 597,77
Washington West Virginia Wisconsin Wyoming		525,222 230,764 744,911 68,601	150,000 74,561 181,443 27,341	117,173 66,612 160,940 24,105	5,700 1,215 2,603	2,291 1,217 1,998	738,100 324,236 976,937 100,521	644,68 298,59 907,84 92,70
Total	30,669,329	27,834,543	6,555,723	5,749,643	102,609	109,170	37,327,661	33,693,35

<sup>(1)</sup> Includes Taxicabs unless otherwise noted.
(2) Includes Taxicabs.
(4) 134,860 light commercial vehicles registered as passenger cars in 1947 were transferred to trucks. 134,972 were transferred in 1946.
(5) Does not include 171,697 vehicles originally registered in other states during 1947 and 179,698 in 1946.
(6) Included with trucks.
(7) Eleven months' figures for 1947.

# 37.3 Million - Highest in History

## Greatest in 22 Years

by States, 1947 Compared with 1946

THE REGISTRATION YEAR

	Per Cent of	Total	TI	RAILERS-194	17	MOTORCY	YCLES	STATES
Per Cent Change	1947	1946	Passenger Car or Tourist	Full and Semi- Trailers	Total All Trailers	1947	1946	
+14.6 +13.9 +11.1 +10.9 +9.0	1.18 .49 .95 8.67 1.14	1.14 .47 .94 8.66 1.16		5,200 22,748	7,889 15,200 23,601 343,858 7,311	6,431 15,200 2,300 51,555 4,218	4,631 1,563 1,962 36,356 3,416	Alabama Arizona Arkansa California Colorado
+8.1 +8.6 +20.9 +15.2 +12.6	1.54 .21 .41 1.87 1.75	1.57 .21 .38 1.80 1.73		5,442 47,000 8.494	17,560 2,965 1,403 52,000 25,968	4,031 557 837 13,000 7,490	4,179 507 916 8.634 4,447	Connecticu Delawar Dist. of Columbi Florid Georgi
+16.8 +27.6 +7.0 +9.6 +7.8	.51 6.38 3.06 2.17 1.88	.49 5.53 3.17 2.19 1.93		809	28,191 50,000 114,754 121,757 13,929	2,688 21,500 20,957 8,933 7.755	1,082 15,605 17,349 5,597 5,787	Idah Illinoi Indian Iow Kansa
+6.0 +9.8 +4.5 +2.1 +7.0	1.39 1.28 .64 1.40 2.79	1.50 1.29 .68 1.52 2.89		29,428	30,855 16,070 12,000 43,644	4,000 6,186 2,601 6,700 5,869	3,501 4,870 1,594 5,422 4,579	Kentuck Louisia Main Marylan Massachusett
+14.1 +8.9 +4.9 +8.5 +11.8	4.89 2.35 .90 2.80 .52	4.74 2.39 .95 2.86 .52	1	204,041 11,794 1,598	217,197 53,373 13,731 66,000 5,576	19,481 9,100 2,144 6,900 1,171	13,029 5,845 2,210 6,468 712	Michiga Minneso Minneso Mississip Missou Montar
+7.6 +14.2 +4.4 +8.7 +17.2	1.27 .15 38 3.27 .42	1.30 .15 .41 3.33 .39		6,000	8,400 3,800 8,530 22,787 5,365	4,300 450 1,702 10,053 1,621	3,915 316 1,229 9,643 945	Nebrasl Nevac New Hampshi New Jersc New Mexic
+9.4 +11.7 +10.5 +3.8 +9.3	7.67 2.04 .57 5.83 1.64	7.76 2.02 .57 6.22 1.66	998	442	98,000 69,023 1,440 184,792 9.271	21,631 11,723 1,138 30,028 6,271	18,909 6,354 574 24,293 4,390	New You North Carolin North Dako Oh
+13.4 +10.5 +5.9 +12.2 +13.5	1.40 6.58 .55 1.10 .59	1.37 6.60 .58 1.09	*********	31,006	76,659 3,266	6,017 26,546 1,780 5,753 2,000	3,691 19,471 1,640 4,277 994	Orego Pennsylvan Rhode Islan South Carolin South Dako
+14.1 +12.7 +7.5 +6.1 +11.2	1.57 5.50 .49 .29 1.78	1.53 5.40 .51 .30 1.77	18,981		100,000 1,363 4,880 28,350	7,499 25,000 1,414 889 12,172	5,297 17,075 869 717 8,040	Tenness Tex Ut: Vermo
+14.4 +8.6 +7.6 +8.4	1.98 .87 2.62 .27	1.91 .89 2.69 .27	6,948 3,346	871 8,025	60,000 7,819 11,371 12,066	7,000 3,255 8,677 783	4,331 2,878 5,955 516	Washington West Virgin Wiscons Wyomi
+11.1	100.00	100.00			2,043,128	416,206	306,580	Total

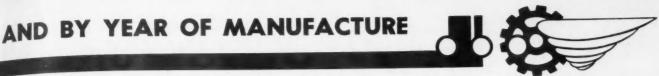
Note: In the above tabulation we have endeavored to make as accurate a count as existing conditions permit. This census is compiled from material secured direct from the state motor vehicle commissioners. Wherever possible, duplications, occasioned by transfers and non-resident registrations, have been eliminated. Data are for the registration year rather than the calendar year, even though this necessitates partial estimates in the case of those states whose registration year ends February or March of the following year.



## CARS IN USE BY MAKES, STATES

		-																							T	
Model	Ala.	Ariz.	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	III.	Ind.	Iowa	Kan.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.	Mo.	Model	Ne
6 Mos. '47' '46-'42' '41' '40' '39' '38' '37' '38' '37' '38' '34' '31' Before '31' Unid.*	699 1116 1017 3411 2123 1564 1060 1140 747 202 142 71 76 48 132 15	290 585 446 1876 1239 853 764 943 680 179 169 96 81 106 336 29 8652	390 794 638 1899 1177 836 568 720 481 141 99 41 155 77 122 23 8061	7982 11995 9588 41600 31918 20438 16490 22411 15396 5492 3674 2313 2116 3049 10913 107 205482	1220 1130 815 3562 2538 1907 1441 2078 1575 352 381 193 249 377 789 18	1053 2521 1478 6602 5898 4752 3907 5096 3527 921 1013 671 555 686 885 95	230 360 183 952 772 544 361 544 316 91 45 44 45 45	1326 1177 677 2920 2217 1352 1021 962 548 118 106 43 75 41 74 269 12924	1338 2902 2394 8966 5895 3999 2940 3208 2215 590 489 268 242 280 379 354 36459	1505 2204 1517 5178 3011 2128 1596 1176 353 280 149 144 127 260 156 21417	324 512 399 1392 909 600 435 626 409 96 97 44 40 112 316 27 6338	6979 10883 6381 25496 18803 12832 9996 12313 7732 2174 1690 1420 738 487 121430	2468 3552 2125 10143 7093 4046 3472 4757 3276 1369 748 356 320 320 31 1142 81 45339	1391 1952 1252 4783 3825 3089 2419 2916 2078 717 494 216 248 492 1740 36 27648	1445 1710 1100 4294 3031 2164 1646 2162 1647 521 433 195 221 296 1013 168 22046	930 1404 923 3648 2634 1989 1386 1869 1284 368 317 135 138 134 270 7	1199 1592 1417 4706 2770 1918 1168 1143 742 175 140 74 72 47 120 65 17348	712 678 439 1613 1609 1163 966 1214 1057 293 358 209 241 311 445 12	3147 2871 2611 3610 3578 2425 1850 1864 1407 714 251 140 151 500 3192 28453		9342 11354 4923 21183 13094 8470 5604 9371 5315 1225 900 411 416 543 1472 3513 97136	700 2154 1491 6072 4963 3848 2951 3508 2714 897 699 415 385 634 1677 10 33118	610 1021 850 2490 1420 1026 574 676 410 143 97 43 32 52 110 43 9597	2937 3410 1644 7429 5471 4042 2769 3656 2465 769 624 318 391 423 1188 601 38137	<b>BUICK</b>	'41 2 '40 1 1 39 1 1 38 1 1 37 1 1 36 1 1 33 1 32 1 31 1 31 1 31 1 31
CADILLA CARRELL CARREL	121 148 110 382 52 63 43 51 47 5 6 3 7 7 7	72 111 60 349 74 48 65 40 17 12 5 9 17 32 7	63 94 58 183 48 45 25 16 3 5 1 2 7 11 2 591	2071 2805 2137 10311 2285 1979 1447 1713 1526 693 419 229 312 510 1109 18 29564	255 185 159 406 88 121 71 118 66 11 17 7 12 26 23 12 1577	370 652 372 1482 342 324 249 284 66 102 41 48 102 125 11	73 75 41 169 31 32 19 30 19 4	351 245 141 608 150 140 97 88 66 17 8 7 4 4 13 11 21	523 880 536 2136 442 351 277 349 251 47 41 25 21 42 43 45 6009	341 388 215 791 146 137 99 129 74 23 10 3 16 10 10 29 2421	46 51 14 101 19 19 12 13 20 3 3 3 4 6 13	1885 2263 1334 5144 1136 994 612 732 573 95 110 47 53 81 117 71	540 569 289 1215 239 169 154 197 148 51 31 10 11 30 47 3 3703	183 217 104 382 83 62 43 86 76 19 12 11 10 3 1348	149 165 57 261 41 73 49 54 53 17 14 7 8 8 31 8	163 175 99 412 78 99 48 97 63 26 25 9 11 11 11 58 4	244 263 206 719 152 108 55 81 60 22 14 10 6 6 7 11 12	197 134 66 294 63 51 400 73 55 15 12 9 6 6 21 23 1	560 405 242 652 221 109 62 90 60 35 24 7 9 6 21 251 2754	833 1021 547 2340 592 486 384 629 465 118 101 50 57 122 132 8 7885	2399 1941 820 2506 333 292 231 312 250 52 42 18 13 50 72 333 9664	106 249 148 634 128 147 64 116 112 28 15 17 14 24 59	73 92 73 201 23 31 19 28 14 7 7 3 7 6 1 1 587	648 551 251 1038 285 231 130 168 162 41 27 12 10 27 49 40 3670	CADILLAC	'46 -'42 '41 '40 '39 '38 '37 '36 '35 '34 '33 '32 '31 a '31 nid.*
6 Mos. '47  '46  '45-'42  '49  '39  '38  '37  '38  '34  '33  '32  '31  Before '31  Unid.'  Total	4067 6290 4870 17059 11883 10069 6108 11122 10819 5270 3852 2187 937 1403 1626 136	708 1098 939 4405 3365 2463 2129 3919 3665 1983 1604 991 557 891 1262 96 30075	1858 3820 2796 9604 6869 5862 4147 6113 7059 3796 2924 2161 1147 1758 103 61801	19662 30653 18553 89741 62613 44518 35512 58158 63375 38811 25883 21903 10748 19270 27522 332 567254	3374 3328 2304 10049 7584 6374 5202 8531 10005 5030 3991 3049 1484 3055 3909 139 77408	2056 5254 2843 13047 10622 7662 5414 10839 10347 5413 4124 3365 1908 1921 1315 226 86356	633 950 488 2671 1891 1415 947 2207 1889 948 627 472 158 316 161 87	3333 2863 1119 4605 3306 1880 1075 1507 1343 579 263 150 141 122 69 636 22991	3661 7103 4875 18526 12949 9386 6711 10671 10868 5163 4308 2417 1481 2382 1822 1524 103847	5281 77773 5777 19568 13956 11333 6456 611390 11708 6819 4698 3354 1511 2305 1858 676 114463	933 1544 1023 4206 3462 2463 1993 3891 4298 2373 1987 984 515 1132 1973 119 32896	17632 25762 12171 53263 41523 30287 24274 38105 41797 19421 13096 8868 5278 8037 9860 1102 351476	7517 10822 6899 29489 22837 14635 13147 25116 28907 15688 9544 5727 3260 4889 6428 362 205267	5774 8503 5598 22647 18826 16764 14905 20735 23951 12760 9545 6654 3988 7890 12773 194 191507	5792 6819 4286 19307 13719 11075 11020 16039 18836 10462 7989 5504 3088 5663 8818 951 149368	3685 5882 3485 13506 11080 8685 7340 12192 12986 7535 5433 4249 2443 3578 3361 42	4493 6006 4329 15351 11076 8304 6482 8759 9637 4240 3247 1948 1173 1331 1455 287 88118	2182 1931 1294 5236 4312 3393 2697 4614 5018 2704 2347 1513 1007 1267 1215 42 40772	9563 8191 7288 11642 10293 6696 4740 6950 6491 3623 1961 1248 1014 1311 1488 10484 92983	7361 9554 5014 24340 18799 15203 10826 20893 20263 11016 8293 5376 2772 2636 1360 60 163766	21643 28294 12806 54509 36283 23566 14916 37122 36771 15102 9882 5459 3376 4707 5554 21426 331416	2560 8361 5335 22710 18251 14529 15555 21029 24708 13702 10354 7417 5086 8625 11847 84 190153	2415 3845 3081 10800 7804 6360 4419 6803 7401 3744 2764 1727 900 1083 1680 254 65080	12715 14130 5830 27099 22012 18420 14641 21038 24669 13224 9871 7975 4790 7961 10970 7115 2222480	当年出版書館の 本の で の の の の の の の の の の の の の	'32 '31 re '31 Inid."
6 Mos. '47' '46' '45-'42' '41' '49' '38' '38' '38' '34' '33' '34' '31' Before '31' Unid.* Total	319 702 242 991 609 435 245 375 200 91 183 47 36 51 66 9	135 299 175 919 467 322 223 519 221 125 60 39 34 47 152 10 3747	136 387 206 617 354 249 192 323 173 117 68 56 25 40 90 5	3436 6722 4508 21525 10424 8036 4737 9195 5908 3115 1504 1384 1050 1374 5025 49 87992	570 655 325 1643 811 611 375 855 565 324 179 104 103 127 411 15 7663	335 1082 525 2550 1443 1040 736 1540 809 415 300 284 167 218 356 34 11834	60 162 60 325 222 130 74 204 90 44 30 14 14 14 14 17 17 18	411 479 292 1232 568 455 256 369 161 58 29 35 21 17 37 100 4519	636 1724 968 3915 1951 1205 753 1344 699 305 194 141 110 164 222 176 14507	594 938 413 1662 823 580 318 676 327 183 130 85 73 63 100 48 7013	147 263 127 544 339 201 190 374 204 114 75 31 23 49 194 10 2885	2493 5328 2074 9893 5165 3738 2417 5573 2584 1362 614 479 319 385 1139 139 43702	876 1768 782 3726 2364 1456 1117 2513 1266 722 310 231 175 253 625 44 18228	762 1116 379 1945 1212 945 621 1252 796 483 242 123 132 224 711 14 10957	685 903 344 1631 966 727 560 1047 562 349 232 116 87 105 502 61 8877	519 776 297 1391 935 721 581 1044 566 365 237 215 135 162 314 3	529 718 447 1458 789 571 397 549 263 90 59 43 32 44 72 24 6085	261 323 112 538 413 269 232 433 198 117 83 51 69 213 8 3399	1078 1360 896 1955 1399 871 549 822 436 318 133 108 50 82 176 1150 11383	1228 2483 856 4103 2491 1943 1256 2902 1304 807 525 331 248 282 356 11 21126	2615 3995 1428 6669 3723 2320 1276 2922 1279 655 293 215 160 199 601 1927 30277	319 1371 720 2944 1699 945 1933 1045 639 307 210 263 336 876 1	344 517 222 747 441 275 181 311 205 96 67 38 28 21 75 10 3578	1225 1727 576 2790 1787 2923 910 1422 737 454 290 214 165 250 551 265 16286	322 107 840 185 286 286 286 286 286 286 286 286 286 286	'37 '36 '35 '34 '33
6 Mos. '47'  441  45. '42  39  38  37  33  32  31  Before '31  Unid.*  Total	181 507 249 767 429 241 414 131 82 19 20 26 30 34 10 3607	97 229 166 464 229 204 397 226 111 53 39 39 38 86 4 2666	86 277 144 335 232 196 113 241 93 63 21 26 19 35 30 16	3825 7105 3624 14672 7728 6386 4164 8125 5416 4942 858 1478 1132 1146 1986 49 72636	284 401 159 764 504 440 329 733 340 179 76 71 38 56 152 7	256 969 336 1801 1356 1081 766 1650 682 371 90 224 146 159 211 26 10124	46 108 34 185 136 100 62 137 46 27 8 8	266 368 232 716 412 301 107 208 79 29 4 5 10 64 2816	420 1146 620 2045 1085 853 509 926 421 219 92 72 66 58 95 122 8749	344 752 352 1003 566 415 299 496 211 111 33 43 32 25 30 29 4742	99 205 96 382 252 204 130 275 142 91 45 34 31 39 77 14 2116	1927 4140 1391 6247 4606 3304 2155 5015 2066 1083 291 499 327 315 605 90 34061	628 1315 625 2832 1896 1446 988 2423 1205 619 148 271 234 297 374 20 15321	312 733 259 1028 681 584 399 865 536 349 89 81 95 98 199 4	335 574 294 997 703 468 452 889 437 272 92 114 99 73 168 44 6011	240 515 218 669 519 458 318 735 328 203 45 107 114 87 118 2	247 500 367 855 509 358 276 325 148 80 26 46 30 52 51 8	235 283 102 403 324 252 206 415 112 59 36 47 43 41 65 5	844 904 592 1003 728 509 341 534 191 130 29 49 61 124 53 808 6800	1055 2066 670 3122 1948 1724 1039 2136 786 393 161 208 139 95 124 13	2052 3384 945 4344 2580 1804 1052 2888 1014 444 164 171 192 186 274 1204 22698	181 885 398 1583 1217 1015 783 1760 746 495 84 134 120 100 216 3 9720	109 243 111 338 247 179 144 163 63 42 16 65 5 13 29 6	788 1424 428 2087 1490 1271 785 1632 727 336 117 228 264 148 269 196	234 59 227 199 140 87 193 139 66 47 23 70 86 71 87 87 87 87 87 87 87 87 87 87 87 87 87	'36 '35 1 '34
6 Mos. '47' '46' '45-'42' '41' '40' '39' '38' '36' '34' '33' '32' '31' Before '31' Unid.* Total	720 1378 929 2661 2217 2136 1012 2195 1465 631 341 166 54 74 255 41 16275	212 528 316 1141 912 776 451 1199 1180 586 347 156 43 64 281 29 8221	273 847 670 1342 1078 1087 548 1320 1076 558 248 200 65 77 285 22 9696	6463 23167 18092 17999 9782 24894 24699	1098 1231 688 2261 1711 1791 1864 2551 2346 1241 468 445 115 227 963 13 18013	887 2544 950 3681 3078 3011 1924 5461 4021 2044 1026 845 169 265 730 85	155 307 91 458 336 305 152 516 395 152 62 62 2 3053	1353 1227 731 1825 1237 1212 581 1013 876 316 133 75 34 16 37 296 10962	1334 3116 1629 5418 3901 3359 1753 3604 2877 1283 688 481 127 181 441 439 30631	1214 2215 1204 3073 2560 2306 1113 2666 1920 857 459 232 91 103 215 144 20372	286 578 278 893 724 616 334 999 969 600 245 159 34 70 440 31 7256	6492 11863 3860 14317 12521 11347 6074 16987 14317 6199 2444 1973 424 730 2412 336 112296	2098 3844 1676 6000 5242 4127 2524 7388 6537 4056 1240 1128 255 384 1448 106 48051	1345 2295 993 3578 3002 3122 1765 3852 3725 2418 875 625 254 429 2436 28 30742	1362 1743 904 2893 2295 2088 1391 3421 2706 1638 676 551 170 293 1600 190 23921	895 1582 725 2389 2167 2035 1377 3726 3007 1778 841 647 155 297 648 12 22281	1142 1647 1391 3023 2273 2120 1217 2118 1730 782 397 235 120 102 308 67 18672	782 858 337 1122 937 943 653 7517 1116 580 343 275 81 144 418 9	2984 2767 2155 3019 2550 1829 1244 2013 1748 942 335 212 78 87 317 2694 24974	2951 4941 2121 7856 6549 6425 3672 9385 7272 3251 1847 1155 264 289 628 32 58638	6494 9314 3284 13081 9918 8542 3294 11638 9389 3475 1423 1225 288 426 1498 6962 90251	673 2663 970 3491 3308 3187 2149 5299 4235 2452 844 656 210 399 1946 22 32504	407 886 534 1240 1019 823 439 902 723 346 226 82 33 39 151 34 7884	2708 3691 1210 4696 4674 4447 2106 5427 4524 2543 1150 1202 294 471 1581 819 41543	670 235 755 648 554 921 277 49 400 400 410	os. '47 '46 '45-'42 '41 '40 '39 '38 '36 '36 '35 '31 '32 '31 ore '31 Unid.*

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-	Model	Neb.	Nev.	N. H.	N. J.	N.M.	N. Y.	N. C.	N. D.	Ohio	Okla.	Ore.	Pa.	R. I.	s. c.	S. D.	Tenn.	Tex.	Utah	Vt.	Va.	Wash.	W. Va.	Wis.	Wyo.	Totals
17 3 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4	145-42 45-42 41 140 138 138 137 136 137 131 140re 131 140re 131 140re 131 140re 131 140re 131	757 961 577 2321 1663 1311 1018 1246 1047 312 267 118 234 1341 24 13309	123 197 145 578 407 235 190 273 189 25 37 20 31 30 144 13 2637	368 430 169 979 1060 752 546 673 654 224 243 100 124 122 250 5	4024 5790 3181 13839 12341 9111 8287 10622 7179 1930 2128 1363 1209 1175 1650 56 83885	428 336 1156 792 497 408 507 318 108 85 27 35 60 132	10763 15878 7727 34674 30519 20861 18274 22601 17759 4829 4767 3305 3129 2937 3918 215 202156	1386 2044 1490 5781 3545 2758 2078 2208 1403 516 457 181 153 331 6 24492	671 510 363 336 271 137 78 44 40 84 372	5189 9354 5358 24713 18294 12224 8493 13146 7759 2003 1640 965 753 779 2340 70 113080	991 1474 903 3907 2899 2276 1594 1967 1506 557 350 172 125 171 594 34 19520	1153 5111 2925 2183	7369 10718 5076 23068 19802 13009 11171 15915 10802 3070 2610 1461 1371 1527 2938 596 130303	715 879 491 1945 1817 1396 891 1174 901 266 315 200 152 140 184 50 11516	642 1047 696 3149 1716 1143 716 843 563 200 159 81 76 90 177 52	313 379 246 989 705 623 455 559 496 158 112 37 32 80 406 84 5674	1224 1683 1418 4556 2610 2120 1455 1599 1037 308 238 97 101 115 210 82 18853	4155 6298 5797 18459 10015 6839 5390 5254 3406 1077 759 335 285 390 856 102 69417	332 561 485 1775 1096 833 610 759 492 124 134 69 55 78 226 6	256 347 182 780 722 564 470 541 524 131 174 86 120 144 267	1873 2266 1158 5744 4106 2907 2202 2260 1587 545 342 183 160 186 299 15 25833	1343 2432 1643 7128 4342 3315 2402 3522 2077 511 597 330 388 641 1446 14 32131	164 464 2587 2126 1512 1230 1517 1043 243 208 97 84 89 198 3 12227	1359 3011 1646 7153 5762 4424 3261 4659 3164 1087 854 465 456 651 2053 5	303 312 236 839 592 434 286 388 314 77 75 35 45 53 158 6 4153	97524 142354 88260 358607 287521 185589 144684 187275 129315 38244 32076 182828 17202 20617 49246 10817
3 50 1 40 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mos. '47' '46' '45'-42' '41' '40' '33' '37' '36' '35' '32' '31' efore '31' Unid.' Total	113 111 48 190 21 20 17 22 22 6 9 5 2 7 17		64 81 24 142 44 40 29 40 28 6 6 1 3 100 19 3 3	1009 1202 686 2760 666 679 502 748 591 123 75 89 180 162 14	77 55 36 157 32 46 15 28 24 7 5 1 7 3 21 1 515	3307 3556 1915 7406 1758 1639 1106 1677 1272 292 275 169 215 352 312 38 25287	256 333 221 716 107 102 71 99 88 13 16 8 6 16 21 2	5 21 15 34 4 11 6 9 6 1 3 1 1 1 1	872 1388 746 3157 676 692 400 689 518 107 128 59 49 76 121 8	197 273 79 574 160 99 89 74 73 20 19 3 7 14 34 6	136 208 182 492 87 104 82 158 158 55 42 29 15 43 83 31 1	1666 1475 836 3554 816 729 472 804 555 139 70 78 142 188 42	156 158 87 426 118 117 67 93 77 13 14 9 5 19 18	113 170 87 350 37 59 30 51 35 13 3 2 3 11 12 2 978	33 27 11 43 9 8 3 9 15 2 1 2 1	227 288 161 660 115 89 58 88 68 18 8 9 15 12 11	917 1075 791 2851 558 461 243 321 249 32 47 14 21 31 39 10 7660	54 81 47 184 43 39 32 26 23 10 6 3 2 23 17	43 57 18 87 15 21 9 30 21 5 4 3 3 14 21	289 294 108 699 130 123 86 116 92 28 12 6 13 23 14 1 2034	197 314 197 773 142 127 79 168 138 30 41 111 7 22 2344	38 76 73 331 70 42 31 64 49 4 3 4 6 6 13 17	251 392 190 758 209 191 92 164 135 26 26 14 13 25 25	23 29 14 86 9 9 7 7 12 8 3	22414 25465 14720 59406 12929 11638 7832 11156 8775 2390 1971 1036 1206 2218 3356 1036 187548
5 5 1411 3 144 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Mos. '47'  CHEVKULE1  349-745- 745- 745- 745- 745- 745- 745- 745-	12684 9242 8182 7124 10104 12081 6232 4596 3494 1888 4456	18	1158 1269 383 2735 2480 2139 1648 2987 3102 1968 1650 1207 723 7455 688 10 24892	9318 6727 4167 3816 2533	1911 1252 1157 4176 3027 2376 1859 2681 3013 1562 1296 768 394 669 981 43 27165	11221 11037 8530	45	253 1703 1425 6007 4601 3260 3123 3982 4057 2941 1405 942 1507 3058 6	13562 25733 13993 65636 48760 31313 22299 50115 52649 23694 17307 10922 6364 40810 336	4448 6336 3381 15938 13317 10500 9038 11915 14398 8667 5556 4173 2047 2780 4246 212	3002 4787 3037 13708 9426 7053 5514 10390 11653 5247 4271 2958 1590 3000 4306 9	16658 25543 12539 57060 46358 32633 25457 49671 45692 21177 16877 11437 7359 8133 7045 1713 385352	1781 1984 975 4690 3987 3074 2104 4172 4164 2502 1769 1365 704 634 357 187 34449	3289 4925 3479 13449 9716 8139 5107 8586 8454 5306 3867 3241 1215 2289 1829 234 83125	1489 1856 1357 5534 4369 3727 3261 4646 5241 2990 2258 1429 830 1626 3616 484 44813	5498 7709 5032 19353 13325 10380 7173 11642 12532 7322 4833 3211 1795 2835 3142 485 116265	15080 22830 18382 65399 44847 33364 28912 37742 42108 21263 16057 13881 5893 7798 11866 396 385818	960 1501 1075 4471 3804 2635 2186 4063 4221 1742 1009 556 868 1187 45 32520	615 889 442 1996 1791 1365 1153 1986 2116 1267 864 670 565 598 683	6998 8290 4177 20105 14938 11476 8373 14376 14429 8439 5415 3399 2201 3121 2773 64 128574	3128 6290 4076 18632 13043 9591 7333 14680 15248 7518 6236 4112 2012 3527 5488 54 120968	790 2225 2361 9172 8052 6029 4656 9437 10311 4368 3088 2144 1229 1496 1823 35 67216	3800 8837 4917 22304 18652 14555 13196 22956 26832 14103 11239 6901 4936 7328 10505 137	1067 958 706 2405 1917 1539 1179 2017 1150 758 479 308 47 690 47 17520	270910 398376 238689 987014 748758 556373 438424 787795 412108 302401 213123 120892 175149 219303 51770 6660497
5 III. 322 100 64421 7 355 298 198 198 198 198 198 198 198 198 198 1	CHRYSLER (242-47-47-47-47-47-47-47-47-47-47-47-47-47-	6 6522 2522 9044 904 905 905 905 905 905 905 905 905 905 905	173 88 326 150 99 58 148 86 35 19 13 13 16 56 8	65 50 36 63 122	2602 1213 6182 3689 2951 2210 2885 1843 1036 547 499 393 451	5	3213 14813 8676 6799 5284 9415 4778 2678 1517 1443 1045 1356 1887	860 503 2246 1275 942 624 1033 513 324 198 127 114 105 201	99 321 190 127 109 202 121 91 46 16 17 37	1668 4618 2195 10361 6334 4409 2960 7110 954 658 440 533 1250 36	468 718 392 1399 888 611 412 676 451 259 130 64 68 61 1251 12 6880	888 413 2475 1247 980 630 1208 702 432 257 171 139 213 649	3012 6587 2365 12823 8636 5821 4045 9395 4303 2287 1444 1001 923 864 1727 284 65517	300 395 134 782 500 409 220 676 343 202 96 84 69 59 134 25 4428	244 500 239 960 531 361 211 414 188 100 84 52 33 49 71 71		804 338 1656 941 614 485 789 477 207 141 80 62 733 125		180 233 182 609 321 256 196 415 214 109 80 45 18 31 108 1	118 159 55 248 184 148 117 212 152 109 53 46 54 63 141	801 1116 364 2275 1305 877 627 949 542 267 159 118 73 133 189 5	429 1089 519 3051 1518 1056 760 1760 966 561 385 244 188 317 934 2	115 445 293 1407 902 565 392 1088 521 271 213 103 106 115 176 2	565 1408 586 2643 1574 1281 899 2060 960 674 355 256 201 332 1012 10	154 168 69 367 223 150 106 195 96 47 37 11 14 28 83 4	37129 70979 32566 148990 84935 63079 41991 84015 43320 24015 13476 10071 7797 9927 24487 4755 701512
111 23 5 22 19 14 8 8 19 13 6 4 4 2 2 2 7	"45-"44" "44" "44" "44" "38" "38" "38" "38"	371 2 113 1 416 2 279 9 252 9 252 3 185 7 380 6 192 1 35 1 43 3 32 2 94 4 8 1 38	100 522 200 85 83 35 111 66 27 12 5 14 14 14 14 11	36 224 249 179 134 207 78 60 24 26 24 34 61	1892 705 3480 2668 2237 1131 1267 665 3 183 289 255 4 278 15	75 236 130 106 75 157 68 43 20 155 144 9	7724 2220 9311 8112 8172 7153 3061 1679 473 917 848 540 707 707 59	782 348 1092 660 506 346 638 277 185 627 513 53 627 77 76	153 81 238 142 121 75 169 54 54 21 15 9 16 60	627 412 605 40	304 618 292 157 62 40 59 31 76	763 338 1624 1004 767 466 1082 644 312 148 167 182 169 279	2781 1289 381 544 641 381 665	18	94 48 13 14 32 40 30	22 15 21 20 57 21	585 291 938 664 500 311 610 262 138 41 64 40 46 51	155 298 17	73 5		515 899 311 1381 981 756 473 866 436 221 51 69 72 92 100 5	480	2	1506 1174 734 1791 959 475 125 223 199 196 430	85 123 52 184 125 102 69 108 59 36 12 17 6 6 15 26 4	32763 69061 32240 19058 5219 7715 6875 6909 10033 3161
433 677 233 754 544 557 777 922 931 230 160 25 45 46 46 67 87	'46-'45-'45-'45-'45-'45-'45-'45-'45-'45-'45	1046 483 1374 1302 1278 730 1657 1608 1057 385 278 146 1320	210 93 305 258 224 113 330 242 163 75 35 30 17 119	544 136 587 584 630 369 907 728 426 213 144 51 71	5839 6 2164 7 8675 8 7274 9 5017 7 11935 8 9481 6 4250 8 2049 1 1643 344 344 321 8 879 58	378 240 722 539 466 319 687 502 277 123 80 22 33 186	16107 5253 21571 17255 18003 11440 7 26797 21500 10571 5276 4772 1084 2941	7 2320 3 1237 3 3675 5 2901 5 2736 3 1523 7 3160 2 2340 1 1264 5 605 2 423 7 137 1 149 5 41	391 7 271 6 673 552 6 452 8 290 9 603 1 514 8 44 22 6 486 1 1	9790 4228 16340 13675 12144 6282 19222 16383 7648 3415 3128 587 653	1547 772 2569 2196 2196 1251 2496 2316 1492 640 505 138 155 920	1625 1103 3343 2256 2256 1043 3319 3268 1585 6376 678 148 219 1475 8	12485 4163 16133 13757 11482 7515 21823 17075 7930 3913 2912 797 776 2491	235 1215 982 1061 568 1651 1369 750 335 177 74 186 53	1091 629 1735 1307 1308 675 1558 1077 596 279 189 83 60 178	711 674 405 809 729 465 171 89 46 76 -579	1993 1255 3430 2693 2693 2734 1260 614 306 614 306 189 508	6752 4278 11832 9191 8559 4288 8894 5994 2998 1407 854 233 452 1758	929 913 775 462 1201 1254 696 328 187 44	236 384 126 440 426 408 308 695 580 295 177 99 46 64 193	1816 2486 1083 4377 3263 2909 1757 3273 2997 1528 615 473 133 203 589 -13	2407 1508 5107 3640 3347 4703 4419 2578 1400 1138 191 347 1666	1391 1026 2661 2311 1125 702 487 126 114 512	1116 4426 4175 3989 2367 7435 6337 3635 1403 1251 224 494 1794	253 288 158 484 390 197 520 495 283 106 84 18 43 182 5 3850	149330 66097 226191 185265 172102 97994 250500 210027 106729 47680 37786 9353 12825 51062

## CARS IN USE BY MAKES, STATE ND

Model	Ala.	Ariz.	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	m. I	Ind.	Iowa	Kan.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn	BAT-		F	Mak
6 Mos. '47 '46 '45-'42	2515 7084 2796	575 1531 562	1174 5020 2240	15657 28179 9847	2916 3994 1455	1164 4592 1368	215 843 220	2267 2946 828	3031 9129 4010	4268 11247 4890	776 1421 595	12655 24472 7388	5730 9649 3372	3926 9795 3621	4146 7351 2727	2620 5905 2231	3987 8553 3675	1870 1973 697	6412 5585 4613	-	15563 30828 8817	Minn. 1644 9877 3829	1846 5715	Mo. N 7913 12220	n los.	Net 47 27 46 55
'41 '40 '39	12762 8846 7185	2835 2188 1832	8238 6075 4969	53481 40377 32315	6470 5318 4557 3549	7031 5765 4369	1270 949 846	2786 1891 1468	15088 10917 8432	19182 15785 11880	2410 2178 1834	31380 24504 21251	16848 14234 10725	16529 14311 12736	12681 9421 7689	8651 6839 6022	14221 10242 8382	2935 2648 2295	5159 4407 3787	15532 13208 10575	45131 31850 22875	17029 13601 11603	2686 10153 7018 5502	3092 15019 12027 9926	200	41 92
FORD 137 136 135 134	4243 9317 9577 5157	1422 2772 3101 2271	3315 6705 7750 5239	25873 48769 55938 48338	7568 7696 5643	3722 9053 8057 5919	528 1260 1257 840	941 1575 1384 895	6299 12201 11254 6709	6945 14056 16336 8983	1419 3363 3245 2435	16094 37335 30103 22515	9323 24286 19404 16632	10717 18796 16855 15905	6641 13716 12254 10537	4287 11544 10384 8114	5289 8902 8350 4435	2038 4274 3896 3065	2462 4398 3226 2582	8838 19924 17601 11954	13416 44664 34486 21313	11209 23757 18717 17478	3291 6558 6527 4155	7569 16710 14800 12822		39 70 38 59 37 105 36 98 35 82 34 42 33 16 32 13
'33 '32 '31	3694 773 811 4630	1477 562 504 1407	3707 941 997 4559	28848 12648 12116 29414	3839 1165 1108 3227	3494 1148 946 3481	421 106 108 524	355 115 82 196	4480 1473 1508 5417	7677 1455 1272 9241	1523 561 388 1250	10241 3373 3515 12889	7114 2698 2355 7324	7051 2695 2232 8818	6564 2200 2096 5961	5002 1614 1723 6358	3272 798 1203 3706	2071 614 600 2429	1131 505 550 1070	7192 2024 1811 5050	10805 3361 4043 9151	8084 3723 2990 11853	2938 716 726 2096	7644 2534 2436 7917		'34 42 '33 16 '32 13 '31 54
Before '31 Unid.* Total	12246 144 91780	4477 96 27612	14240 108 75277	89162 358 531320	10644 130 69279	4808 173 65090	1161 38 10586	339 712 18780	11055 2462 113465	16095 1030 150342	5135 123 28656	34428 974 293117	25727 322 175743	36911 172 181070	28132 875 132991	17104 23 98421	8640 381 94036	3902 20 35327	3319 8343 57549	4975 54 139699	27036 29368 352707	38313 142 193849	9595 295 69817	28647 6412	44 fore Uni 29m Total	'31 22! d.°
6 Mos. '47 '46 '45-'42 '41	225 11	56 1	81 13	1351 29	173	139	2	172	308	339 72	126	1493 17	445 5	357	396	253 8	297	235	334 12	482 11	1523 18	151	120	382 5	1 Mos.	'47 '46 '42
'40																							7-1-1		Ł	'40 '39 '38
FRAZER																						******			FRAZER	'36 '35 '34 '33
'32 '31 Before '31 Unid.*	7				******				46	150	7									70			111444		fore	'32 '31
Total 6 Mos. '47	243	3 60	95	1391	111	52 191	2	10 182	46 367	152 563	134	1536	26 476	363	402	13 274	307	15 254	34 380	72 565	43 1584	153	130	19 406	110 Tota	nid.*
'45-'42 '45-'42 '41 '40	3 7	7 4	2 2	252	10 15		1	1 3	158 44	4 13	6 5	115 84	33 35	4 23	3 12	6 10	6 2	5 15	23 20	80	45 43			12 22 100	-	40 -'42 -'41 -'40
GRAHAM - GP - (34) - (34) - (35) - (36) - (36) - (37) - (36) - (37) - (36) - (37) - (36) - (37) - (3	17 17 24 29	22 17 67 58	8 3 46 11	560 1420 1457	36 31 124 121	255	1 12 9 7	15 7 25 7	102 85 226 145	12 12 52 20	11 18 77 57	233 192 676 388	100 80 203 241	53 64 196 162	41 31 100 55	18 20 98 78	16 14 32 23	39 27 117 75 66	16 29 49 25	125 606 318	186 142 543 373	63 256 233	3 16 9	63	AM-G	'39 '38 '37 '36 '35 '34 '33 '32
A 35 33 33 33 33 33 33 33 33 33 33 33 33	14 10 1 5	50 8 8 5	14 8 1 5	354 272	70 24 33 9	48 48 30	7 1 1	15 8 6 3	116 54 27 20	20 19 7 9	45 23 10 7	324 134 80 48	162 63 55 25	110 27 19 12	65 28 22 11	57 27 16 10		28 23 10	26 13 20 11	118 57 54	216 91 59 53	63 71 78	16 9 9 4 3 1	94 71 39 42	GRAFAR	'34 '33 '32
Before '31 Unid.* Total	12 2 144	13 30 1 290	23 1 132	384 1267 11 8545	32 99 4 608	98 10	1 4 1 43	13 9 117	17 57 31 1082	6 9 2 185	11 31 2 303	78 249 16 2617	43 124 8 1172	52 180 6 908	18 100 10 496	16 42 7 405	18 1 1 142	13 38 1 457	17 42 171 462	99	307	276	6	142	a lor	'31 'e '31 Inid.*
6 Mos. '47 '46 '45-'42	503 964 709	126 322 211	173 459 195	3852	527 591 404	482 1256 445	83 136 63	395 496 212	695 1656 903	653 1131 616	208 378 310	3567 5771 2477	1361 2459 1243	879 1464 834	913 1213 753	509 903 403	511 777 361	497 520 335	1229 1186 585	2575 1016	6261 2699	1342 631	244 436 268	1730 682	AE T	s. '47 '46 15-'42
'41 '40 '39 '38	1089 890 512 373	471 423 244 174	425 359 175 104	7288 3754		1230 640	136 136 83 63	479 434 265 134	1956 1847 1129 910	986 831 575 475	428 425 232 278	6168 6231 3026 2080	3178 3355 1449 1210	1712 1809 1004 860	1178 1083 802 833	695 740 423 412	657 766 493 371	642 551 420 352	681 670 519 279	2346 1561 1299	5581 5696 2797 1866		312 358 176 127	1407 869 673	354 183 168	'40 '39 '38
NOSCONH 330 134 133	984 598 240 124	423 337 202 122	208 189 79 64	5547 3440		1077 562	149 104 45 20	243 181 75 47	1788 1391 492 332	1033 571 251 174	587 473 245 126	5152 3816 1670 847	3079 2969 1676 617	1830 1746 1008 560	1901 1463 936 509	954 770 361 195	651 348 159 58	751 633 309 342	659 511 262 106	2654 1173 1015	859	1125 512	40	1219 607 338	481 657 364 130	'39 '38 '37 '36 '35 '34
'33 '32 '31 Before '31	47 18 30 50	30 37 26 88	16 12 15 49	775 554 566	117 67 120	247 103 157	10	18 9 12	115 90	69 39 26 47	22 11	266 136 233	239 122 208 764	182 87 206 754	224 90 156 496	72 63 76 239	41 21 27	137 82 221 347	65 48 50 179	473 238 325	188	94 211	12	97	10 23 121 e	'33 '32 '31 ore '31
Unid.* Total 6 Mos. '47	7148	17 3253	19 2541		13		1049	67 3088		50 7527	18 3872	131	54 23983	17 14952	100 12650	6821	19 5301	10 6149				13551	13 2680		3743 T	Unid.* otal
'46 '45-'42 '41 '40	3	2	2 2	39	5	1		3		7	1	8	17	6 3	2	7	*****	******	7	4	41	1		2 2	Ļ	46 45-42 41 40
	6 2	4 6 3 7	4	70	19	39		10 17	10	1 12 2	1 2	124 106 30	25 27 13	12 26 2	6			3 1 1 5	4 2 9	31 63 8	73	54	1	6 7 1 2 3 18		39 38 37 37 36
HUPMOBIL 133 133 133 133 133 133 133 133 133 13	6 5 5	12 7 2	3 6 5 1	247 192	38	107 76 49	2	17	35 32 11	24 17 9	15 5 1	159	94 48 26	85 30 13	43 19 5	32 29 17	11 7 7	18 17	18 11 11	131 106 68	81 54	1 130 1 74 3 76		3 18 7 57 2 26 2 26 2 34 3 43		36 '35 '34 '33 '32
Befo re '31 Unid."	9 15 1	31	21	312 1535 19	97	74 187	7	10 19 12	21 82 10	24 43 30	17 2	118 426 11	49 159 9	47 273 6	18 133 2	37 71 1	11 20 1	28 46 2	19 81 104	91 158	55 200 110	314	1	7 191	1	fore '31 Unid.* Total
Total 6 Mos. '47 '46	303 32	65		1626	192	226		114 202 5	355	442	120	1669	555	349	479		328	141 277 5		659	215	7 19		4 623	185	Mos. '47 '46 '45-'42
'45-'42 '41 '40 '39		******	*****				*****	*****						*****											11.07 11.07 11.07	'41 '40 '39 '38
XAISE 138 138 138 138 138 138 138 138 138 138	*****									*****															a kinnel	37 '36 '36 '36 '37 '33 '32 '32
'32 '31 Before '31 Unid.* Total		1 68	183	4 2 3 174		7 22	i B !	208	25 411		8 130	1710			488	360	34	283	1 1 3 42	6 1 0 70	3 6 7 224	1	6 19	13 641		dfore '31 Unid.'

Unid.\*-Unidentified as to year of manufacture.

Data from the Reuben H. Donnelley Corp. are as of July 1, 1947.

## TEND YEAR OF MANUFACTURE-continued

ndel is. '47	Neb.	Nev. 195 394	N. H. 336 544	N. J. 4947 9724	N. M. 1012 1356	N. Y. 14132 26418	N. C. 4163 11376	N. D. 247 2287	9295 21411	Okla. 2981 6950	Ore. 2088 4001	Pa.† 10572 22680	921 1756	2329 6246	968 2057		Tex. 11246 29531	048 1507	Vt. 431 750	Va. 1	Wash. V 2524 6057	551 2533	Wis. 2407 9106	843 1041	Totals 19552 41336
'46 15-'42 '41 '40 '38 '37 '36 '35 '34 '33 '32 '31	9277 7900 7099 5939 10525 9880 8219 4272 1620 1368	394 186 738 600 444 394 656 718 576 346 116 127 382	136 587 584 630 369 907 728 426 213 144 52 71	2948 13228 10711 8179 7356 17027 13081 10256 5154 1819 1850 5545	777 2945 2118 1675 1215 2260 2243 1545 1072 377 361 1094	6675 31421 26026 20704 18910 46694 41445 31397 16439 6387 5552 15601	4764 22043 17018 13524 9922 17975 18225 12875 7961 2190 1875 11803	1146 5293 3850 2944 2775 4641 3804 3960 1804 849 649 2412	7214 36648 28355 22794 14837 52291 42183 26288 13551 4901 5038 13073	3198 13951 11811 10242 8104 13395 13516 11255 6433 2211 1647 5176	1404 6896 5451 4256 3435 8466 9197 6143 3614 1635 1347 4126	6274 29436 23763 18025 14449 40038 32918 22070 12710 3785 4201 11032	434 2317 2197 1903 1490 3366 2837 1943 963 317 321 1349	2617 12094 9849 8213 5409 10420 12499 7644 5927 1602 1034 10427	940 4408 3578 3295 2817 5814 4920 4168 1932 718 678 2163	3756 13510 10036 8338 4956 11380 11273 7364 4809 1138 1221 6445	14982 56565 43160 33512 23991 38967 38445 25518 17301 5429 4124 15041	619 3008 2293 2071 1605 3456 3760 2576 1508 545 356 1163	227 1182 1142 962 861 1831 1807 1426 897 292 371 1127	2872 14481 11149 8919 6537 12536 10730 8674 4630 1600 1536 5181	2447 9968 7351 5670 4583 12148 13662 9257 5271 2285 1828 5359	1119 5544 4386 3632 2680 7762 7182 4850 2980 1044 1087 3663	2910 14349 10967 9932 9104 22749 18482 16699 7397 2927 2702 7681	443 1844 1341 1139 883 1732 1744 1297 713 297 245 700	14982 65853 51361 41385 31424 70319 64255 47464 26901 9293 8644 28642
pre '31 Unid.* otal	22542 148 104479	1164 -23 7059 40	75	9420 106 121351 511	3658 87 23795 159	1320	23142 248 179104 382	30	859	21561 229 132660	15421 14 77494 215	1056	134	203 13002 151	199	14441 587 111519 265	670	4029 24 29168 50	1705 1 15012 62	363	20599 39 109048 244	9176 36 58225 48	29223 210 166845 240	91	81456 5851 808721 1711
'46 '45-'42 '41 '40 '39	.,,,,,										3									27			3	2	
'38 '37 '38 '38 '38	8																								*****
'33 '31 re '31 Jnid.'	1	1 43	16 103	77 588	160	188 1519			7 869	7 217	2 220	7	150	*****	5 220		12		64	2 392	1 246	48	243	2 95	18
tal os. '4' '40 15-'4'	7										46	73											12		
4 3 3 3 3	0 8 9 24 8 20 7 38	10 35	11 6 62	23 140 98 514	5 4 7 16	74 347 208 970	11 4 57		155 438 298 1344		34 112 119 432	115 335 255 1087 657	5 16 11 64 34	4 5 8 26 12	7 11 23 14	5 19 13 58	23 72 67 158	7 23 34 136 124	1 3 7 25 25	17 41 37 81 80	29 88 113 411	22 36 30 175 109	36 115 83 389 264	8 7 6 27 27	3
33333333	5 27 4 29 3 12 2 7	11 8 1 2	32 25 12	237 71 86 48	7 1 1	644 288 283 161	48 15 12 8	16 2 2 4	606 254 175 78	42 20 9 4	365 131 72 42	545 231 194	22 14 7 6	13 9 2 3	16 3 3 6 3	56 29 8 13	84 29 27 11	71 40 22 15	21 8 15 9	84 53 17 18	261 116 77 37	54 23 18 22	204 92 44	11 8 3 2 7	
re '3 Unid. otal	304	16 1 131	31 227	168 8 1730	12	437 30 4308	23	101	387 11 4680	268 268	217 3 2009	397 37 4256	15 3 207 337	15 1 100 475	47 134 156	33 1 305	82 1 719	52 6 553	164 115	45 1 504	234 1 1810	67 1 592		117	5
45-4	16 533 12 299	111 51 114 70	93 316 334	2071 892 2719 2313	178 99 204 3 240	6423 2132 5135 5098	1305 867 1398 1355	210 52 160 173	5105 2200 6183 6303	792 378 599 691	928 492 1230 891	5634 1833 5472 5333	429 100 401	790 536 955 867 516	253 84 161 187 109	909 468 840 774	2888 1619 2690 2545	305 367 468	188 61 219 206 144	1348 494 1231 1023	1489 826 2360 1543	525 348 835 839	2398 2298	118 236	3 8 7
	38 303 37 580 36 560 35 290 34 242	33 93 104 0 33	357 325 194	7 2757 9 1842 4 809	245 197 5 72	6848 5573 2828	725 3 410	257 219 102	7838 5971 2 2693	904 721 3 383	1334 1508 760	6882 4576 1695	383 382 175		123 227 277 191 103	912 619 334 181	2 2662 1919 761 430	541 495 218 133	133 331 290 175 126	973 728 421 263	2646 3 2577 1 1278 7 652	976 7 778 5 316 2 200	2453 2266 1262 705	136 76	8 8
ore '	. 11	8 6 8 6 1 36	8 11	6 186 1 256 3 62 3 1	8 14 1 37 9 2	651 844 7 1754 2 66	54 84 84 216	17 108	300 7 404 8 1421 30	21 1 23 1 137 0 14	7 3 9 7 44	286 437 1171 2 253	35 45 69 11	48 16	20 6 22 114 16	37 38 126 32	7 59 8 85 6 296 2 43	26 42 130 3	71 47 94 155	55 15	90 5 133 2 643	60 2 53 7 144 6	192 251 1042	16 18 2 36 11	3
otal los. '	47 46 42	2 783	309	1 1944	2 1758	3 50223	3 10342	1628	8 4828	6367	7 9930		*****	6072	2049	6723	3 20927	3784	2355	890	1713	5 6073	19113	1910	0 64
	41 40 39 38 37	2		2 2 4	3	13 13 11 11 11 11 11 11 11 11 11 11 11 1	8 7		5 30 2 4	8	2 2 5 4		1 4 7	1	1	1	8 12 8 19 2 2	8		1	7 2 5 4 5 1	8		1 2	1 2
nurmup	'35 4 '34 '33 '32	5	1 1	7 6 5 12 9 6 5 7 2 7	9	9 3 28 1 22 4 23 . 24	3 2 0 9 7	8 9 7	2 9: 4 18: 3 18: 1 8: 4 10:	6	7 4 6 2 3 1 3 1	5 121 9 286 8 149 6 146 3 170	29 23 13 17			2 14 7 25 7 14 3 10 5 20	4 24 5 52 4 22 0 8 0 22 8 20	16	10	1 1 2 2 1 1 7 2 2 1 1 7 2 2 1	8 2	6 2	8 13: 8 8: 7 1: 4 4:	9	7
fore ' Unio Total	'31 10 d.* 21	7 2	3 11		6 1 5 2	0 252	2 9 3 10	335	6 146	8 6 7 9 13	3 21 1 8 46	6 677 20 5 187	163	76		1 19	7 298	94	111	3 12	6 31 6 67	1 4 3 13	62	8 1:	i
'45-	'46 '42 '41 '40			65			3 45		3 118	8 23 9 5		4 133	5 130	238	200					7 44		6 10	0 34	0 10	3 2
	'38 '37 '36 '35																								
Total		36 4	i	83 66	5 19	8 193	19 46	3 4	15 120		1 28	6 133	8 135	251	- 22		9 98	5 100	8	51	8 30	3 10	o 34	4 10	8 2

Unid.\*—Unidentified as to year of manufacture.

Data from the Reuben H. Donnelley Corp. are as of July 1, 1947.

## CARS IN USE BY MAKES, STATES NO

Model	Ala.	Ariz.	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	III.	Ind.	Iowa	Kan.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.	Mo. N	ant Mode	el Nel
6 Mos. '47 '46 '45-'42												* * * * * *								*****		*****			Mos.	'47 · · · · · · · · · · · · · · · · · · ·
"41" (40" (39" (38" (35" (35" (35" (35" (35" (35" (35" (35	97 103 56 163 49 14 15 2 4 9 9	97 102 68 120 48 36 7 5 7 7 516	52 61 43 84 34 21 9 1 4 1 1 4 1 315	2766 2853 1852 3877 1816 1190 503 221 204 202 2870 28 16382	210 194 103 228 99 50 39 11 11 24 37 1	547 533 357 702 215 144 53 54 28 59 109 18 2819	71 69 43 91 27 16 7 2 2 2 2 7 2	194 205 111 166 48 30 10 2 1 7 25 21 820	593 600 375 679 248 123 80 15 16 22 31 70 2852	275 264 135 238 93 59 21 6 3 7 13 16	28 29 23 49 21 12 6 2 3	1635 1400 839 1677 626 326 119 48 50 57 131 73 6981	441 360 283 580 218 139 57 11 10 13 3 2166	149 177 117 234 107 84 26 9 3 12 35 2 955	111 99 82 180 76 57 23 3 2 3 11 7 654	163 152 101 235 61 61 29 13 8 5 23	134 156 83 163 59 32 13 4 5 2 2 6 9	144 129 78 153 80 43 20 6 3 7 25 4 692	177 215 124 186 70 28 17 3 12 4 27 645 1508	1017 929 693 1344 497 269 138 57 52 83 117 13 5209	898 767 456 1031 328 202 72 17 19 258 241 4117	15	42 70 47 82 27 12 2 1 5 8 8 10 306	393 373 243 487 201 115 44 22 9 14 71 39	1	id."
6 Mos. '47 '46 '45-'42 '41 '40 '38 '38 '37 '36 '37 '31 '31 '31 '31 '31 '31 '31 '31 '31 '31	75 105 66 161 129 157 99 174 44 2 1 2 3 3 2 7 4	40 47 28 132 196 135 121 178 55 4 8 4 4 5 3 11 21 988	46 79 29 88 83 79 52 95 40 1 5 2 2 2 3 3 2 608	1026 1534 875 3071 3212 3100 2717 3408 1809 196 130 99 151 125 345 15 21813	141 126 56 204 281 233 164 291 133 10 14 2 2 3 18 17 1701	133 276 79 347 340 262 186 324 118 21 11 16 13 10 27 23 2186	17 27 8 36 35 29 23 36 15	115 110 50 185 143 108 77 116 36 14 5 2 2 22 295	342 512 252 733 715 654 459 646 235 24 18 6 17 16 32 53 4714	136 247 101 300 252 288 202 282 59 11 9 3 3 1 2 9 21 1923	31 38 25 52 67 83 60 90 90 1 2 1	701 1139 443 1191 1190 977 688 1012 412 57 62 20 28 23 63 34 8040	193 224 93 348 367 318 277 468 193 19 10 10 40 2589	108 178 61 226 230 185 171 322 154 6 3 2 2 7 1 1 28 3 1685	110 148 70 294 291 202 188 255 119 5 5 3 6 1 16 1721	59 130 45 149 172 186 137 227 73 11 14 4 5 7 10 11	614 1322 539 1648 1141 781	74 50 15 94 90 89 67 160 34 6 10 3 3 9 15 2 721	313 194 142 135 126 81 56 93 39 8 1 1 3	368 493 179 680 610 569 427 733 329 39 49 19 43 20 45 8	745 888 358 794 866 884 669 1055 365 28 55 9 20 16 21 337 7090	9 21 9 24 1	55 93 63 149 130 124 76 132 24 23	220 411 109 500 454 313 287 397 181 20 10 9 8 23 7 46 2995	Mos 45	'47 '46 '42 '41 '40 '39 '36 '37 '36 '35 '33 '32 '31 e '31 nid.*
6 Mos. '47 -45-'42 '45-'42 '45-'42 '38' '38' '37 '38' '38' '38' '38' '38' '38' '34' '31 Before '31 Unid.' Unid.'	334 856 275 1313 868 613	168 253 120 542 451 274	204 566 220 733 545 418	3816 7972 2186 10541 9529 6758	838 975 290 1159 1126 808	432 1204 261 1090 1101 858	57 113 27 124 107 82	250 296 89 360 299 253	709 1846 678 2325 1845 1338 230 8971	627 1676 686 2119 1518 1110	182 327 128 486 396 264	2933 5322 1284 4467 4248 3060	1008 1501 419 1855 1750 1137	693 1415 379 1496 1415 1160	583 1013 259 1255 1135 863	337 761 188 848 759 516	614 1322 539 1648 1141 781	279 271 84 317 385 324	922 580 256 404 366 264 342 3134	1596 2348 435 1960 2062 1353	3699 6023 1438 6067 5243 3786		254 677 276 898 566 402	1220 2236 505 1929 1697 1121	MEKGUKT E	3. '47 '46 5-'42 '41 '40 '39 '38 '37 '36 '35 '34 '33 '32 '31 '31 '31 '31
6 Mos. '47 '45-'42 '41 '40 '39 '39 '38 '37 '36 '35 '34 '31 Before '31 Unid.' Total	510 809 306 408 415 314 198 336 185 38 37 7 5 13 11 36 15 3636	185 385 148 350 283 234 150 298 212 81 44 8 22 36 115 14 2565	239 595 161 382 274 228 129 180 131 36 14 10 15 46 12 2483	3538 6451 2652 7138 4907 3811 2547 5046 3776 2753 1275 415 572 646 3174 42 48771	657 716 240 745 614 450 326 899 574 182 164 36 73 63 310 6059	742 1683 428 1338 989 725 567 1323 801 236 311 118 152 93 331 26 9363	92 155 42 124 90 65 41 113 49 7 15 7	428 500 103 253 190 131 98 85 73 222 155 3 24 9 229 2018	869 1701 703 1418 1133 811 587 795 425 135 122 34 63 85 154 101 9136	788 1260 423 802 557 427 289 457 256 52 52 15 21 14 54 37 5502	223 345 120 409 265 193 124 317 208 63 40 5 10 21 123 15 2481	3855 6592 2899 7190 5905 4630 2601 6493 2844 905 589 168 252 252 973 212 46360	1083 2000 716 2107 1575 1174 632 1663 731 448 200 41 51 85 390 41 12940	738 930 461 1224 972 811 678 1316 956 219 215 59 119 122 737 18 9635	1009 1082 500 1131 755 503 422 838 556 119 199 24 58 65 513 67 7851	519 763 228 683 555 373 291 604 266 130 104 22 33 37 139 54753	716 1022 304 716 490 297 218 414 283 97 96 28 46 31 84 14 4855	449 517 207 419 336 311 192 535 286 98 176 35 86 80 221 7 7 3955	1345 1470 560 853 465 457 262 293 228 152 81 25 31 46 154 6970	2197 3173 902 2223 1698 1755 1334 2916 1622 515 754 137 263 184 389 23 20085	3902 5090 1632 4640 2463 1719 959 2604 279 208 45 96 85 401 1738 26845	1813 1166 1196 1871 1081 292 247 59 136 137 760	221 339 255 184 131 213 118 47 44 9 166 111 54	745 345 248 5J 131 136 489 209	270 Mic 387 2221 438 359 304 195 440 21 21 151 162 21 21	18. '47 '46 15-'42 '41 '40 '29 '28 '37 '36 '35 '35 '34 '33 '32 '31 '31 '31 '31 '31 '31
6 Mos. '47' '45-'42' '45-'42' '49' '39' '38' '38' '34' '34' '33' '32' '33' '34' '31' Before '31' Unid.*	529 789 567 1885 1324 963 635	163 308 271 1124 823 653 445 700 454 189 49 29 47	303 585 331 1265 830 647 378 687 677 379 180 46 14 41 50	5887 8712 6006 27119 19368 13017 9597 19395 17756 12074 4294 1123 5396 2014	867 793 544 2272 1605 1251 890 1602 995 458 96 48 121 301	913 2028 1145 4803 3586 2693 1758 3526 3238 1631 763 278 122 191 196	212 381 171 830 637 425 254 595 425 212 84	935 812 425 1695 993 537 315 610 535 225 74 17 15 24 24 24 181 7417	816 1877 1402 5294 3506 2146 1594 2825 2337 1132 446 115 63 3119 165 313 24150	953 1493 902 3278 2245 1542 986 1721 1307 667 253 44 28 50 40	235 392 232 911 660 464 332 658 562 348 162 37 28 5171	5158 8146 4512 17800 12336 7722 5251 11607 10252 5423 2129 633 294 654 868	2016 2746 1761 7191 5382 3040 2476 5667 4757 3302 1120 327 1403 610 134 41079	1029 1488 849 3377 2516 1926 1313 2612 2608 1810 714 252 96 290 579 36 21495	1319 1595 856 3437 2457 1818 1226 2347 1996 1433 615 144 408 131 19989	815 1224 674 2638 2020 1487 1022 1921 1784 1000 447 108 41 137 136 8	937 1095 875 2860 1780 1232 828 1230 1093 472 177 28 35 32 61 52	652 559 500 1624 1253 875 658 1252 1246 644 289 120 79 152 162 13	2354 2104 2160 3021 2130 1295 799 1236 1017 645 264 95 44 48 78 163 2564 19973	3995 5213 2882 12192 8762 6473 3951 7511 7285 3594 1525 472 249 341 233 32	7521 8234 3838 14088 8745 4990 2969 8337 7154 3492 1538 391 193 5446 722 4172	408 1509 8 1060 8 4291 5 2982 0 2211 7 3213 4 3014 2 2204 5 834 1 292 3 453 4 553 6 534 5 633	336 558 441 1336 944 566 359 600 412 231 692 283 193 243 253 353 263 273 373 373 373 373 373 373 373 373 37	3060 1417 5911 4440 2963 2044 3812 3575 2213 1014 307 156 270 562 583	182 946 676 470 323 Y 568 513 340 144 66 21 37 99	0s. '47 '46 '45-'42 '41 '40 '39 '37 '36 '35 '34 '33 '32 '31 fore '31 Unid.*
6 Mos. '47  -46  -45-'42  -49  -38  -38  -38  -34  -33  -34  -34  -34	241 269 585 659 311 231 673 218 78 15	168 354 497 230 266 468 217 98 255 77 28 812 59	13 2 22	3259 3779 8279 10222 5522 5489 9655 5910 2984 513 466 552 483 2069 35	95	674 638 1666 2530 1090 1287 3120 1328 527 186 95 161 76 316 50	169 211 101 102 234 90 34	405 240 568 600 295 274 534 213 76 41 10 355 17 37	378 670 833 1908 2282 1162 2170 890 . 325 85 45 47 159 143	395 142 32 20 31 20 46 65	245 84 90 233 98 46 4 2 8 3 22	2726 1018 242 111 201 115 413 119	66 52 52 40 105		277 352 216 496 646 266 359 737 328 158 34 20 22 13 47 43	239 554 687 339 376 1032 435 176 31 166 42 13 72	16 8 40 15	27 90 8	32 78 1179	1230 2898 3776 1916 2145 4981 2318 965 251 1566 279 2113 349	1984 1329 2753 39226 1266 1388 4300 1116 5 50 9 44 188 188	1 533 9 422 1355 2 1355 6 1577 7 78 6 366 1 77 7 44 9 9 9 9 9 9 9 2 4	177 146 146 156 165 165 177 178 178 178 178 178 178 178 178 178	7 713 5 533 1 1366 1 820 9 880 5 953 1 1898 2 837 3 339 3 55 2 65 68 68 64 2 42 6 146 9 139	165 161 228 78 140 283 114 64 4 1	flos. '47 '46 '45-'42 '41 '40 '39 '38 '37 '36 '35 '34 '33 '32 '31 '40 '39 '36 '37 '36 '37 '37 '37 '37 '37 '37 '37 '37 '37 '37

Unid.\*-Unidentified as to year of manufacture.

Data from the Reuben H. Donnelley Corp. are as of July 1, 1947.

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## AND YEAR OF MANUFACTURE-continued

## Mary Republic Service   Mary Peter   Mary		14							N. M	BA	v	N. C.	N. D	. Ohio	Okla.	Ore.	Pa.	R. I.	s. c	. S. D	Tenn	. Tex.	Utal	Vt.	Va.	Wash	. W. Va.	Wis.	Wyo.	Totals
1	Mod	del s.°47	Neb	. N	lev.	N. F		4. 3.																						
The color of the	'4	'41		42	56													30 14	5 1	08	27 2	12 65	56	58	52 23	34 28	139	292	27	19635
The color of the		'39 '38 '37		41 71	35 49		55 71	756 1541	3	17	1746 3581	160 250		14 72 29 156 12 64	4 11 4 19 15 7	9 11 6 28 8 12	8 8 1 18 24 6	50 17	1 1	28	20 20	19 65 75 25	50 52	75 36	87 24 36 11	45 40 13 14	183 18 60 16 31	462 159 124	34 12 9	9657 5737
1	20	'36 '35	5	19	10	1	32	298 162 97	1	6 2	670 340 202	11	5	3 1	50 2 74	3 4	13	47 93	9	7 4		7 5	7	16 5 1	8 6 1	38 10 5	61 2 16 11	3 21 3 11	1	1137 888
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The color of the		Unid. otal	*	284	22	9	367	617	3	30	1088	110	2 1	4 2	93 1	04 1	03	663	81	77	26 1	111 4	143	27 53	28 1 24 2	130	87 1 92 3	1 21	1 18	13818
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1	The same		39	134 124	5	11	50 45 70	56 50 68	31 32 34	64 45 91	1491 1256 2118	25 25 3	59 39 16	45 69 1	701 2 189 2	93	255 129 1	697 300	69	95 130	36 81 27	122 229 58	847 852 332	75 137 76	34 53	231 266 93	530 19 255	96 50 34 21	4 35	8336
12	THE PERSON	2	36 35 34			3	34	1	10	2	149	1	7 7	3	30 35 25	13 3 3	6 7 9	58 52 19	6 5 2	3	1	9	14	5	1	5	15 10	5	9 4	810 451 642
The color		1	32	5		2	1 2		42 27 53	3	6 15	9 2	3	3	23 21 42	7	6	21 59	5		1 7	4 4 15	11 35 16	6		4	38		10	2 1256 5 1176
March   Marc		Uni	d.*	1025		95	404	50	95	523	1302	1 20			505 1 637	909 2 479	381	7691 2564	295	349	192	641	1760	166	68	861	431	68 5 276 18	72 10 14 18	39239 75900
8 86 120 240 250 381 120 320 381 120 320 269 160 730 269 160 730 269 160 745 269 170 2			'46 '42	765 239		90 34	149	26	119 166 309	280 129 494	591 101 498	6 16 12 1 37 2	586 556 286	133 516	1034	348 592	215 1106	812 3847	337	344 1234	129 456 453	354 1350 1002	1811 6251 4236	107 524 457	30 173 163	1395 1215	1393 1212	508 18 502 17	68 27 27 24	71 85588 14 73835
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1		Mo:	'48  5-'42	56	66 18	61 40	3	73 10	2784 711	179	9 8	595 757	1142 364	304 224 378	5900 1836 6443	965 297 680	567 1739	1768 5836	174 531	239 340	182 368	507 1071	1199 2313	160 346	43 142	229 689 419	829 2522 1380	623 4 490 3	1968 3535	155 78830 144 56941
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1	4 11 23	MASI	'36 '35	3	79 43	102	2	35 99	1235 373	7	6 3	478 061	185 60 67	130 81	2250 685 612	299 152 72	212 192	734 895	48 99	15 20	74 47	95 77	177	120 81 15	33 39 8	120 91 21	211 176 47	121 19	846 174	16 11163 2 2718
1	10		'33 '32 '31		23 50 43	1 6 6		42 57 53	105 315 200		3 6 1 4	003 635	34 15	26	247 175	31 19	112 69	515 336 1193	36 29 61	10 6 42	19 184	32 21 84	63 285	30 106	29	34 94	109 489	122 3	307 1466 • 25	10 4573 58 18870 2 3809
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32 39 111 35 306 10 175 21 770 74 135 633 61 31 90 189 147 275 87 55 88 610 139 1048 68 9985 81 1126 11 62 478 13 1421 75 21 774 1421 155 633 61 31 90 189 147 275 87 55 88 610 139 1048 69 9985 114 275 87 55 87 52 21 51 79 67 13	17		44'3'3	0 1	019 811	217	7	779 650	7950 5816	6	04 1	9128 3548	2641 1778 1142	466 324 232	12891 7869 5181	2314 1639 1144	1546 1035	9289 6097	1061 786	711 391	474 260	1516 939	5003 3633	622 415	442 298 425	1660 1011 1805	2546 1979 4016	742 1576	2413 5709	152 85984 359 171654
32 39 11 35 306 10 19 17 75 21 740 74 185 633 61 31 90 19 147 275 87 55 88 61 10 139 1048 68 9985 126 11 126 11 16 24 477 326 35 35 1476 65 157 1309 149 342 997 46 40 282 1184 275 87 55 87 52 87 55 88 114 55 24 69 9885 11 11 16 49 6 162 2 83 31 162 11 11 6 49 6 162 2 83 31 12 2 354 57 22 51 79 67 13 13 11 6 49 6 162 2 83 31 12 2 354 57 22 51 179 87 67 13 13 11 6 49 6 162 2 83 31 12 2 354 57 22 51 179 87 67 13 13 11 6 49 6 162 2 83 31 12 2 354 57 22 51 179 87 67 13 13 11 6 49 6 162 2 83 31 162 1 114 179 1179 1179 1179 1179 1179 1179	5 3		DWG	17 1 16 1 15	100 156 782	180 193 114	6 3 4	777 788 414	7895 3811	3	187 1 229	8513 9009	1579 948	346 316	11845 5907	1718 1295	2038 971	11182 5476 2512	1408 627 247	597 375 158	507 362 135	1379 707 271	2250 821	471 1 168	269 165	879 310	1862 1053	829 377	3258 1460 493	195 86703 73 36312 23 11077
Tital   93   93   97   95   95   95   95   95   95   95		66 21 37	5 3	33	90	1	5	85 35	591 306		31	1725 917	98 75 75	39 22 21	626 276 740	88 44 74	119 75 185	337 633	3:	21	26	41	99	7 30	62	45 77 88	161 301 610	28 69	518 1048	32 10414 58 16499 6 9985
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36 202 82 164 2219 103 5383 408				41	264 405 178	13	36 60 68	302 326 184	296 448 216	1 4 6	193 215 105	9849 4625	102 55	9 9 6 3	5 5382	649	94	6 817 1 342 5 364	8 49 9 33 2 31	0 58 0 29 7 27	5 9 5 7 1 8	4 109 0 52 5 46	0 307 3 130 6 142	8 38 4 16 11 19	1 14 8 14	7 724	4 690 3 794	386 443	789 827 1931	58 40985 64 44384 138 94206
34 8 7 16 284 9 665 34 4 189 19 24 37 361 32 9 7 25 36 10 7 311 45 10 36 3 4035 33 7 3 8 160 7 345 24 1 129 19 24 200 22 9 7 25 36 10 7 31 45 25 71 3 4035 33 7 3 8 160 7 345 24 1 129 19 24 200 32 9 7 25 66 18 16 35 87 25 71 3 4035 37 14 3 25 66 18 16 35 87 25 71 3 4035 37 14 3 25 66 18 16 37 35 81 127 2287 32 14 5 20 29 5 648 32 5 244 21 55 343 37 14 3 25 66 18 16 77 23 59 11 27 2287 38 166 19 7 3 13 46 7 17 23 59 11 27 2287 38 166 19 7 3 13 46 7 17 23 59 63 14 3 5 844 3 844 3 5 844 3 5 844 3 844		283 114 64	$\sim$	'36	410 202	1	27 82	404 164	526 221	9	256 103	11534 5383	120 46 18	16 9 18 3 16 2	6 6019 9 247 5 95	68 31 7 17	98 8 52 9 20	8 368 5 158	3 31	1 22	1 9	8 33 5 10	3 91 16 34	18 22 17 8 53 1	5 17 6 6 0 1	7 24	782 1 347 7 55	427 169 30	458 66	24 1770 5 389
3 Hore 31 55 21 39 549 29 993 64 12 398 7 2 153 27 11 9 35 20 3 1580 7370 9458 4484 9574 732 504051		1 9 5	57"	'34 '33 '32	8 7 14		7 3 5	16 8 20	28 16 29	14 30 35	9 7 5	665 345 648	3	32	1 12 5 24	9 1	9 2	24 20 55 34 28 16	0 13 16	12 137 1	9 4 7	7 2 3 2 3 3 1	5 1	36 1 66 1	7 1	7 3 16 3 17 2	5 87 3 59 7 29	25 11 63	71 27 143	3 408 228 5 884
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## CARS IN USE BY MAKES, STATEND

Model	Ala.	Ariz,	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	111.	Ind.	Iowa	Kan.	Ky.	La.	Me.	Md.	Mass	Mich	Mirro	881.		1
6 Mos. '47	1438 3346	412 761	669	10817 14831	1828 1852	1268 3206	286	1786 2244	2202 4840	2176 4164	451	10307 16334	3682 6513	2837 4302	2410 3418	1747 3200	1877	1396	5102	5177	9544	1295	Miss.	Mo. No. 4933	del Neb.
'45-'42 '41 '40 '39 '38 '37 '36 '35 '34 '31 31 32 31 31 32 31 31 32 31 31 32 31 31 32 33 34 35 36 36 37 38 38 38 38 38 38 38 38 38 38	3346 1775 5803 4088 4070 2272 4367 3101 1863 1445 838 274 Will 129 79 34981	761 2280 1980 1573 1042 2349 1936 1122 884 488 210 73 77 51	2097 1037 2978 2059 1984 1436 2841 2273 1519 1167 650 325 92 134 31 21292	9640 43183 36199 29986 19655 37628 36760 26356 16760 13969 5210 2633 1626 190	1852 1010 3844 2941 3150 2039 5033 4709 2554 1807 1412 603 225 340 41 33388	3206 1921 8743 7346 7562 4439 9157 7925 4134 3026 2366 937 119 204 179 62532	497 213 1130 847 776 490 991 848 423 284 210 69	2244 1288 3732 2252 1953 1015 1496 1085 509 223 133 43 11 9 507 18286	2993 11200 7832 7265 4324 7284 6038 3039 2369 1612 857 239 306 803 63203	2509 8426 5833 5182 2713 5743 4664 2640 2089 1276 345 102 112 294 48268	786 466 1616 1492 1301 841 1971 1981 1307 843 459 197 104 147 40 14002	7102 30811 25316 23006 13871 28526 28526 25569 12983 7865 5551 2130 823 1237 639 212070	4066 16836 13237 9744 8100 15815 15096 9845 6023 3897 1230 801 675 252 115812	4302 2323 8269 6634 7335 4892 8571 8785 6155 3245 2170 949 450 892 83 67892	3418 1713 6291 4985 4778 3667 7336 6817 4491 3038 2054 743 315 634 314 53004	3200 1718 6068 4664 4700 3439 7108 6017 3892 3091 2453 798 332 388 24 49539	3235 1939 6683 4592 4293 2929 4521 3392 1696 1335 646 222 102 195 160 37817	1243 651 2484 2013 2018 1520 2723 2199 1308 1097 793 465 133 197 23 20263	5401 4575 6781 5938 4347 3143 4067 3810 2224 177 280 177 160 6306 54277	8103 4315 18551 14039 14264 8625 15090 13408 6403 4524 3209 1157 187 170 50 117272	11834 5889 26021 16641 14623 6533 21477 14969 7127 4583 2628 1214 384 723 11402 155592	5354 3137 9974 9036 8772 6772 11812 11107 7117 3298 2837 1746 663 1287 33 84240	2394 2130 1317 2663 2177 1180 898 365 95 58 102 72	6840 8 2707 4 11618 10023 10 9631 11 1522 10 9645 10 10 10 10 10 10 10 10 10 10 10 10 10	46 249 5-42 111 40 280 39 316 38 22! 37 400 36 44! 35 29! 34 17! 33 11! 33 22! 34 7! 35 29! 34 7! 37 400 38 22! 37 400 38 22! 39 31 7! 30 31 2! 31 2! 32 31 32 31 7! 33 32 33 33 33 33 33 33 33 33 33 33 33 3
Mos. '47' '46' '45-'42' '41' '49' '39' '38' '37' '37' '37' '34' '31' Befor e '31' Unid.*	559 949 880 2812 1397 1074 1420 908 405 166 132 53 59 54 24 11596	196 422 298 1287 841 483 339 804 566 402 132 115 49 32 101 23 6090	367 777 526 1838 1080 696 420 1013 838 534 139 113 43 99 99 11 8593	7000 10150 7432 33460 22840 13762 9443 20532 15612 8583 2582 2318 949 1380 2547 85 158675	913 874 646 2555 1598 1013 713 1762 1355 1103 378 296 152 240 302 29 13929	1155 2503 1546 6261 5018 3361 1791 4691 3203 1593 939 1001 309 456 302 85 34214	254 448 296 1088 698 445 247 642 448 197 97 98 1	1221 1179 531 2186 1542 778 396 738 404 160 71 89 16 25 13 226 9575	841 1904 1601 5557 3324 2107 1451 2929 1940 1126 497 427 169 227 308 24575	1053 1662 1264 3784 2208 1382 770 1737 1090 608 326 231 94 97 59 118 16483	222 314 252 877 606 290 254 655 519 322 106 66 24 62 94 24 4687	5921 8933 4830 19982 14081 8693 5812 14940 8931 1926 1602 467 938 1369 376 103392	2298 3331 2143 9104 5831 3025 2273 6745 4944 3037 976 716 354 618 1060 98 46553	1197 1663 1068 3963 2945 2379 1675 3747 2843 1946 759 584 239 641 1074 25 26748	1482 1696 1101 4055 2573 1702 1377 3233 2527 1576 640 573 246 425 912 165 24283	945 1317 867 3111 2148 1461 994 2462 1679 951 396 352 153 213 233 16 17298	1041 1367 1306 3765 1863 1251 733 1150 890 431 139 97 52 66 85 63 14299	1041 879 546 2360 1523 1170 830 1685 1194 623 402 316 209 275 281 19	2900 2568 2531 3632 2719 1680 986 1697 1253 838 289 284 113 181 169 2988 24828	3429 4842 2782 12447 7884 5592 3030 7755 5582 2829 1514 1362 524 662 361 30 60625	9636 11612 5588 19190 11946 6404 4797 12438 7317 4155 1207 1049 329 628 1129 5365 102790	677 1986 1307 5181 3567 2556 1887 4800 3486 2404 684 731 3555 83E 1580 14	65 42	2391 2 2981 1 317 6 6011 4 4211 1 2926 1 1975 1 4439 3 3561 2 2001 7 933 7 60 7 323 635 7 684 3 5916 4 439 1 439 1 449 1	os. '47
6 Mos. '47' '46' '45-'42' '41' '40' '39' '38' '37' '38' '38' '31' Before '31' Unid." Total	816 576 1421 1113 415 180 357 193 89 67 12 23 21 45 14 5558	319 120 206 642 514 384 178 348 263 141 121 38 45 43 185 3 3550	280 112 245 551 514 283 126 265 126 75 76 20 16 25 54 54	9254 3094 5506 15765 13103 10615 5362 8402 7476 4039 3242 1813 1601 1482 5154 95966	617 142 449 1173 991 647 348 776 485 282 232 65 99 129 275 16 6726	1244 336 591 1756 1418 690 1532 782 423 347 152 157 159 322 29	228 47 109 292 232 185 94 200 62 31 31 31	566 171 297 754 559 414 238 276 159 68 42 9 14 14 12 101 3694	1299 419 842 2357 1948 1322 547 988 452 258 209 56 75 85 149 222 11228	1233 300 729 1670 1165 801 325 690 318 232 106 45 40 51 82 67 7854	449 102 307 781 659 406 234 476 283 111 13 21 444 92 23 4169	5774 1311 3186 8279 6400 4672 2442 5115 2578 1314 781 239 245 274 904 128 43642	9433 771 2045 5548 4234 3068 1627 3396 2326 1035 486 240 194 204 686 61 35354	1527 349 918 2522 1877 1347 757 1540 928 606 403 92 99 199 551 25	1358 251 586 1480 1137 840 458 937 580 428 370 88 912 129 367 46 9147	857 185 426 1148 881 632 317 707 386 225 154 58 55 52 143 12 6238	1368 322 844 1801 1320 624 335 490 299 155 95 25 39 28 79 52 7876	604 131 180 507 415 323 219 477 239 177 123 52 84 114 209 1 3855	1476 1273 1031 1511 1132 722 725 311 524 434 198 107 66 55 84 140 1148 10195	14	3712 663 1619 4308 3078 2078 721 1902 845 468 415 152 143 471 1162 21825	1826 1026 1977 1117 1408 647 204 241 272 673	2394 2130 1317 2663 2177 1180 898 365 95 50 102 72	283	os. '47 '46 '45-'42 '39 '38 '37 '36 '36 '36 '36 '37 '36 '37 '31 '31 '31 '31 '31 '31 '31 '31 '31 '31
8 Mos. '47' '46' '45-'42' '41' '40' '38' '38' '36' '35' '34' '34' '31' Before '31' Unid.*	19 4 416 547 432 126 151 321 81 45 24 21 8 8 11 64 11 2281	42 36 51 120 99 37 81 248 60 15 15 77 7	3 5 13 43 35	531 2136 122	110 63 79 154 204 82 91 475 82 300 9 34 29 91 307 15	103 134 92 226 318 153 184 644 60 17 24 36 44 55 160 13 2263	22 29 27 49 53 10 27 67 66 6 22 4 329	105 127 95 70 38 46 38 44 4 4 5 2 7 24 613	119 329	17	168 50 27 11 7 9 24 84 9	360 597 1794 133 53 37 80 156 208 845 46	274 386 230 544 665 288 413 1629 191 115 24 93 112 157 553 27	85 169	15 47 89 121 626	51 55 69 176 11	149 96 204 239 322 91 202 241 45 27 30 14 13 14 41 24	12 12 12 28 48 157	219 443 190 115 143 205 17 6 6 16 29 33 100 314	829 396 535 591 232 330 303 6 897 7 85 6 117 58 7 87 8 124	35 38 47 65 91 394	214 292 3 103 3 303 5 833 7 9 5 15 1 24 4 97 4 1	3 42 175 1 141 2 120 3 42 3 52 3 110 5 18 2 9 9 5 9 5 9 176	973 331 352 184 239 819 185 56 50 60 60 60 60 60 60 60 60 60 60 60 60 60	15, 47, 46, 42, 41, 40, 39, 38, 38, 34, 35, 34, 33, 32, 31, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1
Mos. '47' 46' 45-'42' 40' 40' 39' 38' 37' 38' 38' 34' 33' 32' 31' Unid.* Total	44 52 25 51 44 46 45 29 32	13 21 23 29 28 124 57	119 55 114 114 114 2 72 2 200 3 161 3 76 47 2 29 3 20 3 3 3 37 4 20 7 100	685 513 385 427 597 417 687 982 6 792 8 222 7 152 8 7741 125	76 69 99 54 116 131 85 51 2 43 2 43 7 12 6 7 6 7	108 77 201 128 121 87 164 183 168 138 134 104 6 206 6 778 7 238	55 42 84 55 69 340 99	466 677 644 399 422 1166 1518 1919 1919 1919 1919 1919 1919 1919	340 200 446 312 394 226 206 149 251 220 469 469 469 242	315 204 592 369 255 143 300 2 293 177 1 144 9 9 9 23 2 23 2 122	55 388 318 22 777 674 773 36 68 33 68 33 68 31 1 4 1 1 3 3 1 1 4 1 1 1 3 3 9 9 3 3 6 6 2 2 4 4 2 4 4	3 381 1 186 7 1253 7 1253 464 3 429 6 220 6 548 5 600 1 380 1 254 4 254 4 254 4 254 2 2 288 9 865 9 865	824 149 161 161 171 172 173 173 173 173 173 173 173 173	69 42 9 103 117 8 183 77 120 6 86 8 89 8 89 8 65 6 155 5 125 3 100	422 318 747 558 700 500 500 600 660 550 500 500 660 550 500 50	105 50 101 355 560 300 300 36 51 377 37 44 44 3024 4 224	190 117 346 193 146 89 137 138 88 62 43 43 60 61 153 216	50 50 50 50 50 50 50 50 50 50 50 50 50 5	102 102 102 102 102 102 102 102 102 102	2 3047 7 177 88 228 2 212 2 213 1 222 1 1 222 1 302 6 253 0 233 8 217 8 226 8 253 1 88 8 217 8 88 8 217 8 88	310 7 143 8 349 2 289 9 269 8 155 8 322 423 9 127 160 120 123 124 125 126 127 140 120 120 121 121 121 121 121 121 121 12	0 22 3 39 9 100 5 15 9 17 5 2 1 5 1 4 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7	7 1114 4 411 774 4 662 4 422 443 5 1177 6 655 5 225 5 2 219 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6 195 0 73 73 77 201 2 171 9 104 4 215 9 213 4 158 7 117 0 123 6 104 107 117 1 177 1 949 3 4720	140 '46 '45 '46 '45 '46 '45 '41 '40 '39 '37 '36 '37 '37 '37 '37 '37 '37 '37 '37 '37 '37
Total All Makes	314203	127520	213254	2697362	2 29620	435328	-	128208			9 12124	3 160963	9 82129	2 62673	7 43903	4 374052	33075	5 17250	1 37054	83243	2 144924	6910	56 20963	743497	al All Makes
																									Ur

Unid.\*-Unidentified as to year of manufacture.

Data from the Reuben H. Donnelley Corp. are as of July 1, 1947.

## U. S. SUMMARY—CARS IN US MAKE

	July 1 Total	47	46	45-42	41	40	39	38	37	36	35	34	33	32	31	Prior to 31	Yr. N Gin
Buick Cadillac Chevrolet Chryster DeSoto Dodge Ford	1,788,159 187,548 6,660,497 701,512 510,611 1,723,681 6,087,284	97,524 22,414 270,910 37,129 28,200 86,816 195,528	142,354 25,465 398,376 70,979 58,419 149,330 413,363	88,260 14,720 236,869 32,566 23,279 66,097 149,828	358,607 59,406 987,014 148,990 93,979 226,191 658,538	267,521 12,929 746,758 84,935 64,288 185,265 513,617	185,589 11,638 556,373 63,079 50,312 172,102 413,856	144,684 7,832 438,424 41,991 32,763 97,994 314,244	187,275 11,156 743,432 84,015 69,061 250,500 703,190	129,315 8,775 787,795 43,320 32,240 210,027 642,553	38,244 2,390 412,108 24,015 19,058 106,729 474,649	32,076 1,971 302,401 13,476 5,219 47,650 269,018	18,828 1,036 213,123 10,071 7,715 37,786 92,938	17,202 1,206 120,692 7,797 6,875 9,353 86,444	20,617 2,218 175,149 9,927 6,003 12,825 286,420	49,246 3,356 219,303 24,467 10,033 51,062 814,583	10,1 51,1 4,3,13,58
Frazer Graham Hudson Hupmobile Kaiser La Salle	18,508 51,469 644,992 22,601 23,128	17,184 46,237	76,721		1,213 82,041 307	1,322 75,681 119	3,823 42,471 897	3,125 35,554 1,071	11,824 84,965 249	8,364 68,429 1,234	6,648 33,397 3,123	3,001 19,586 1,900	2,070 7,817 1,317	1,443 4,511 1,511	1,918 6,503 2,330	5,971 19,630 8,119	5

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## TEND YEAR OF MANUFACTURE—continued

IN	del	Neb.	Nev. I	N. H.	N. J.	N.M.	N. Y.	N. C.	N. D.	Ohio	Okla.	Ore.	Pa.†	R. I.	S. C.	S. D.	Tenn.	Tex.	Utah	Vt.	Va.	Wash. V	V. Va.	Wis.	Wyo.	Totals
3 7 4 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	s. '47. '46 5-'42. '41. '40. '39. '38. '37. '36. '35. '54. '33. '32. '31. re '31. Jnid.'	1923 2490 1116 3747 2801 3164 2256 4025 4458 2981 1703 1165 371 282 701 71 33254	175 341 165 632 478 401 249 539 468 302 172 105 42 19 26 34 4148	574 856 227 1389 1368 1368 1613 1513 887 663 493 286 60 73 17 12254	4609 6836 3938 17677 13895 13855 9838 17020 14448 7188 5060 3689 1676 325 286 108	574 679 397 1478 1035 1004 694 1292 1279 713 462 255 91 38 59 50	11254 19671 9723 43772 35621 35459 24674 40179 35826 18092 13187 10632 5321 968 1067 270 305716	2431 4470 3125 10922 7002 7220 4288 7801 6173 4005 3371 1998 531 146 400 11 63894	204 1083 723 2174 1602 1228 908 1467 1236 1202 573 391 158 89 261	7266 14639 9289 32893 30076 26836 14607 36020 31430 17046 13170 9024 3329 917 1318 166 252956	1504 3169 1152 4687 3992 3597 3079 5128 4611 3164 2149 1162 378 158 272 70 38272	1437 2039 1487 5798 4726 4014 2427 6078 5648 3617 2588 2013 960 239 470 7	12085 18525 8834 40053 29127 29020 18358 38854 35042 16423 12972 8593 4168 588 1042 1055 274740	1168 1310 626 3240 2634 2991 1489 3580 3580 41731 1230 792 2855 64 65 129 24488	1164 2187 1559 5404 3673 3565 1790 3618 2788 1556 1321 884 190 65 76 89 29929	883 1025 525 1807 1485 1085 1728 1708 1241 599 343 179 100 323 186 14657	2281 4169 2258 8086 5428 5250 3591 6687 5524 3515 2707 1616 602 189 271 270 52444	6337 12490 7254 23105 15354 15379 10787 18488 14341 7763 5676 3534 858 505 820 177 142958	507 773 658 2060 1743 1559 990 2188 2010 1278 846 549 118 41 83 17 15420	358 514 223 1052 920 874 692 1185 1133 741 528 350 220 76 104	3552 4676 2384 10531 7544 6801 4554 6893 6318 3797 2446 1561 440 227 179 28 61931	1566 2828 2283 9527 7102 6290 4150 9680 8774 5407 3862 2910 1443 528 831 39 67220	543 1783 1366 5269 4171 3697 2622 5852 5497 3166 2520 1635 530 206 194 17 39088	2350 5223 2588 9829 8767 8447 6336 12342 11603 8164 4662 3399 1394 818 1211 70 87203	499 548 275 934 718 679 473 940 902 542 326 202 78 40 77 11 7244	140569 229930 127219 499181 384989 359858 233049 454956 402048 231797 159393 112517 45585 15649 21119 26597 3444516
1 1 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	145-42 145-42 140 139 138 137 136 135 134 133 132 131 136 131 131 131 131 131 131 131 131	780 971 616 2039 1317 928 646 1556 1304 915 331 246 125 251 661 23 12709	92 171 105 424 251 130 102 248 168 104 32 26 6 4 17 13 1893	364 466 145 976 758 596 375 808 610 365 209 202 90 157 133 4 6258	4316 5932 3191 15076 11378 7961 5281 10417 6789 3456 1629 1802 650 531 483 78955	232 250 255 856 548 304 186 434 30 249 77 60 19 23 40 5	8632 13834 6464 29826 21115 14985 10238 20683 14616 8361 4197 4867 1636 170 163090	1772 2619 2161 6853 3851 2402 1502 2598 1558 1089 548 474 146 234 148 3 27958	61 303 275 810 462 287 237 451 341 336 129 132 41 100 285 3 4253	4373 8823 5436 22993 15334 9452 5688 17286 11621 5738 1638 1435 1870 89 113914	926 1387 857 3811 2717 1921 1214 2723 2224 1414 441 328 116 164 285 46 20574	1118 1555 1129 4322 2925 1508 1161 2758 2091 1062 386 331 115 267 461 2 21191	6407 8981 4788 20890 15411 9368 5773 16021 10122 5198 2461 2377 799 1065 1196 462	776 800 429 2011 1372 1054 537 1386 981 543 301 278 116 149 100 58	782 1132 1052 3053 1567 959 540 1057 674 474 195 206 49 81 71 37 11929	269 359 176 727 422 306 239 557 465 365 135 74 249 57	1261 1537 1118 3885 2097 1505 944 1832 1474 717 295 186 78 123 137 90 17279	3262 5003 3973 12904 6892 4290 3157 5664 4077 2549 913 728 226 327 540 49 54554	307 431 422 1498 1005 454 373 886 594 397 120 83 30 56 107 9	315 417 269 815 591 436 237 580 482 275 171 151 92 123 85	1823 2233 1059 5361 3604 2244 1291 2556 1779 1105 451 405 175 232 222 10 24550	1181 2050 1525 5753 3765 2181 1473 3863 2636 1504 535 434 201 388 575 15 28979	140 448 643 2186 1616 963 613 1717 1497 694 286 246 112 167 163 10	1151 2624 1535 6598 4754 3080 2359 6254 4892 3282 1150 489 923 1648 42 41993	166 195 171 494 258 157 130 341 278 188 64 44 155 27 43 9 2580	87669 127903 79399 311269 207873 132657 87808 205924 143680 81739 32367 29750 11476 17549 24161 12104 1593328
8 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	os. '47 '46-'42 '41-'40 '39 '38 '37 '36 '34 '33 '32 '31 re '31 Unid.*	858 167 460 1144 741 603 319 585 448 301 227 77 91 108 511 13 6653	127 37 75 210 174 130 62 119 80 41 24 13 12 13 35 6	191 131 100 313 305 231 164 296 165 101 107 37 43 56 96 2	756 643 211 317 318 533	128 367 290 207 95 180 87 49 41 7 10 6 57	1684 2737 7880 6317 5182 2958 6160 3013 1664 1725 699 938 841 1521 69	1557 313 790 2127 1458 910 278 464 216 157 133 36 51 46 135 4 8675	171 99 203 474 346 211 105 203 118 97 81 26 14 29 146 1	4174 1018 2641 7760 6788 4882 2139 5462 2378 1447 1070 330 339 364 1075 36 41903	504 482 385 1197 959 696 343 672 494 264 182 54 45 46 172 13 6508	1316 300 960 2449 1671 1124 674 1324 997 558 432 104 122 237 608 2	7701 1715 3206 9686 7000 6128 3352 7660 2759 1391 1147 364 507 588 1259 262 54705	550 132 208 623 490 546 229 509 159 78 57 26 32 29 75 24 3767	605 134 314 780 653 453 128 284 125 73 84 23 18 29 49 18 3770	46 174 33	1118 3885 2097 1505 944 1832 1474 717 295 186 78 123 137	3874 821 2336 5424 3629 2757 1624 2874 1446 792 502 174 156 190 419 47 26865	383 91 331 957 773 688 329 650 359 156 104 19 23 24 120 2 5009	197 35 83 225 175 144 92 152 66 44 36 12 27 31 97	1178 741 606 1932 1506 966 473 678 378 207 182 7 71 56 53 129 3 9159	1490 401 1264 3689 2615 1989 1080 2182 1722 1007 697 202 241 299 832 6	342 141 469 1328 1218 877 397 891 399 114 39 44 81 185 5	1448 365 961 2969 2374 2022 884 2187 1454 793 519 182 209 287 937 12	227 46 105 329 248 134 90 152 103 64 44 13 8 22 59 3 1647	88235 21936 44507 122578 95432 71663 36217 73472 41612 23886 17639 6493 7158 7731 20797 4141 683497
55 52 19 10 10 10 10 10 10 10 10 10 10	** 46	108 96 41 105 328 43 16 9 16 63 120	7 1	77	612 801 340 509 1256 8 8 22 125 126 9 160 356	8 657 752 466 620 105 105 105 105 105 105 105 105 105 10	1624 1105 1355 1693 784 1245 2606 263 4 82 8 98 98 1388 1388 77	105 193 470 26 26 21 26 23 28 91	9 66 65 113 77 18 60 111 15 3 3 1 1 6 18 39 - 257 1 859	194 104 294 300 379 1789 90	80 84 161 146 243 114 167 470 76 39 22 23 22 12 150 10	58 351 24	363 1099 81	14 33 101 6 7 8 20 18 18 18 32	36 8 10 46 12	16 84 110 38 46 131 17 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	498 498 401 425 479 479 402 402 479 402 479 402 479 402 479 479 479 479 479 479 479 479 479 479	49 79 509 21	41 15 4 6 6 16 64 3	47 18 23 59 69 24 46 101 31 4 5 111 36 37 87	214 205 148 216 220 143 204 409 36 19 11 17 32 48 134 3 2059	123 193 499 407 588 132 220 1143 551 218 96 89 64 136 560 5	4	76 26 11 59 191 225 891	188 538 468 129 888 12 4 4 3 3 3 7 13 3 3 3 5	16793 13488 20284 23272 8268 12631 38265 7566 4072 2248 3149 3327 4664 17872 2445
31 37 37 37 37 37 37 37 37 37 37 37 37 37	16s. '47' '46' '45-'42' '41' '40' '39' '38' '38' '38' '31' Unid." 'otal	31 13 44 55 43 38 33 64 36 29 35 25 50	77 33 66 77 33 100 44 111 144 255	15 12 11 29 35 25 17 36 27 44 212	193 2 111 3 20- 6 144 2 199 1 11: 9 166 187 7 156 7 157 7 233 8 344 2 113 6 13	38 207 117 144 444 205 55 23 129 22 33 129 22 33 14 120 120 120 120 120 120 120 120 120 120	50 508 50 273 50 1488 30 2322 30 650 30 383 30 383 451 512 513 514 515 516 517 517 518 518 519 519 519 519 519 519 519 519	101 101 101 101 101 101 101 101	19 12 21 33 15 9 13 14 29 314	89 136 249 209 462 104 217 384 328 258 246 392 2034 372	106 86 30 48 70 76 51 70 105 52 51 35 26 43 352 134	266 477 544 511 117 244 40 118 96 67 53 96 202 1289 70	194 158 148 302 480 103 124 388 388 388 36 266 53 548 548	593 522 1244 848 638 639 1199 769 769 769 603 473 474 1495 117	666 31 42 36 44 20 31 31 32 32 41 22 32 33 41 22 33 41 22 34 41 42 41 42 41 42 42 43 44 44 44 44 44 44 44 44 44 44 44 44	30 20 20 20 31 20 31 32 31 32 31 32 32 32 32 32 32 32 32 32 32 32 32 32	1523 1233 1233 1233 1233 1233 1233 1233	334 3264 3512 3513 313 178 266 7 228 0 133 119 7 105 62 3 107 614 614 614 614 614 614 614 614	23 9 17 17 19 12 20 20 18 14 20 18 16 21 25 27	20 16 12 26 42 31 24 13 12 30 58 211	190 113 115 79 59 58 66 68 68 74 43 79 262 71	513 110 117 45 113 170 126 104 87 80 218 1353	42 15 73 26 36 43 51 38 47 34 51 347	47 122 243 48 183 33 84 177 133 83 132 14 24 24 7 156 8	7	6181 4110 9556 7920 3 7267 3673 2 6498 8274 5910 4675 2 5315 4845 7630 39024 13584
97 119	al All Nakes	322115	34905	99977	90838	0 9325	6 222755	559711	133605	1750323	411922	371775	1779610	155666	30065	14316	4 40991	1355939	131860	73311	467939	530695	256541	74565	6573	27521395

Unid.\*—Unidentified as to year of manufacture. Data from the Reuben H. Donnelley Corp. are as of July 1, 1947.

## IN US MAKES AND BY YEAR OF MANUFACTURER

	July 1 Total	47	46	45-42	41	40	39	38	37	36	35	34	33	32	31	Prior to 31	Yr. No Givan
nin. mury h snobile kard	134,953 353,774 540,383 1,403,681 504,051	9,266 39,239 52,071 75,088 24,367	13,818 75,900 85,739 109,049 32,623	5,970 20,801 28,930 64,836 28,741	19,489 85,588 78,830 256,597 65,755	19,216 73,835 56,941 183,530 87,067	17,397 53,943 43,304 123,681 40,985	13,848 31,192 85,984 44,384	21,281 66,740 171,654 94,206	8,936 36,485 156,890 42,370	905 13,594 86,703 17,700	810 11,163 36,312 3,899	2,718 11,077 2,460	5,424 5,382 4,065	492 4,573 10,414 2,287	1,256 18,870 16,499 8,844	1,17 4,46 3,80 9,98 4,29
nouth . tiac . debaker lys . cellaneous .	3,444,516 1,593,328 683,497 191,706 147,861	140,569 87,669 88,235 13,362 13,399	229,990 127,903 21,936 16,793 6,181	127,219 79,399 44,507 13,488 4,110	499,181 311,269 122,578 20,284 9,556	384,989 207,873 95,432 23,272 7,920	359,858 132,657 71,663 8,268	233,049 87,808 36,217 12,631 3,673	454,956 205,924 73,472 38,265 6,498	402,048 143,689 41,612 7,566 8,274	213,797 81,739	159,393 32,367 17,639 2,248 4,675	112,517 29,750 6,493 3,149 5,315	45,585 11,476 7,158 3,327 4,845	15,649 17,549 7,731 4,664 7,630	21,119 24,161 20,797 17,872 39,024	26,59 12,10 4,14 2,44 13,58
Totals	27,521,395	1,367,295	2,056,130	1,065,336	4,085,413	3,113,260	2,378,798	1,679,027	3,303,955	2,789,570	1,592,404	967,340	567,768	345,826	596,039	1,377,057	236,17

March 15, 1948

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## World Registrations by Continental Divisions and Countries

By Special Arrangement with The American Automobile (Overseas Edition)

## AFRICA

	Motor Vehicles	*Cars	*Trucks	*Drees	Motor
Amerolo	5,578	Cars	Trucks	Duses	
Angola	50.000	28,000	21,000	1.000	
Algeria					2,379
Belgian Congo	12,405	5,206	7,113	86	
British East Africa	29,280	16,618	12,207	455	1,471
British Somaliland	845	50	793	2	10
British West Airica	13,000	5,550	7,450	Ť	*****
Canary Islands	3,284	1,888	1,210	186	145
Egypt	41,740	32,500	7,260	1,980	3,425
Eritrea	2,749	1,078	1,615	56	*****
Ethiopia	6,308	3,728	2,543	37	404
French Equitorial Africa	3,240	640	2,600	Ť	*****
French West Africa	17,000	6,500	10,500	+	*****
French Somaliland	200	****	*****	****	*****
Italian Somaliland	3.085	655	2,400	30	291
Liberia	500		****	****	*****
Libya	500	*****	*****	****	*****
Madeira	1,225	855	270	100	25
Madagascar	3,263	1,346	1,867	50	155
Mauritius	3.376	2,560	665	151	302
Morocco	38,241	23,262	13,100	1,879	4.567
Nyasaland	2,136	1,069	1,011	56	360
Portuguese East Africa	8.111	3,548	3,434	1,129	*****
Reunion Island	2,105	1,549	524	32	******
Rhodesia	36,544	25,139		125	1,717
Sevehelles Islands	247	*****		****	
Southwest Africa	7.921	4,485		41	216
Sudan	3,201	1,491			
Tangier	1,351	937			128
Tunisia	16,045	10,355			2,255
Union of South Africa	410,673	328,172			21,333
Total 1947	724,153	507,181	202,164	7,783	39,183
Total 1946 (Revised)	608,870	437,699	158,500	7,922	*****

## OCEANIA

	Motor Vehicles	Cars	Trucks		Motor- cycles
Australia	926,729	550,409	376,230	*	86,636
Cook Islands	94	33	61	*****	*****
Fiji Islands	2.610	1,359	1.004	247	168
Hawaii	99,705	78,002	21,703	+	*****
New Caledonia	2,572	908	1,627	37	288
New Zealand	282,692	209,210	72,292	1,190	14.571
Niue	14	7	7	******	*****
Other Oceania	2.000	******	******	*****	
Samoa (Amer.)	131	80	8	43	*****
Total, 1947	1.316,547	840,008	473,022	1,517	101,663
Total, 1946 (Revised)	1,255,191	845,141	403,654	6,396	100,565

<sup>†</sup>Included with trucks.

## ASIA

	Motor				Motor.
	Vehicles	*Cars	*Trucks	*Buses	eycles
Afghanistan	3,700	400	3,300	*	
Arabia	5.177	2,363	2,661	153	
Bahrein Island	610	200	350	60	******
British Malaya	30,000		******		*****
British North Borneo .	151	34	48	69	19
Burma	24,931	2,756	18,006	4,169	2,000
Ceylon	28,455	19,653	6,414	2,388	*****
China	30.000	******	******	*****	*****
Cyprus	3,266	1,832	682	752	786
French Indo-China	2,500		******	*****	
Hongkong	7,970	4,472	3.361	137	*****
India		133,608	61,426	26,969	16.000
Indonesia	24,636	12,500	12,136	÷	2,450
Iran		8,164	9,427	2,114	750
Iraq	12,800	5,800	7,000	+	*****
Japan		******	******		*****
Macao		116	58	2	*****
Palestine	16.883	8,122	7,355	1,406	2,573
Philippines	75.250	******	******	*****	*****
Siam		******	******	******	
Syria and Lebanon	14,700	8,600	4,800	1,300	*****
Trans-Jordan	1,300	800	500	*	*****
Turkey	13,414	5,190	8.224	+	900
Total, 1947		218,610			25,478
Total, 1946	400 000	258,022			*****

<sup>†</sup> Included with trucks.
\*Incomplete for all territories.

AMERICA

	Motor				Motor.
	Vehicles	*Cars	*Trucks	*Buses	cycles
Alaska	11,173	7,131	3,930	112	68
Antiqua	480	406	55	19	-
Argentina	319,056	218,447	100,609	+	*****
Bahamas	2,276	1,745	527	4	76
Barbados	2,877	2,063	814	+	
Bermuda	1,290	826	442	22	*****
Bolivia	11,284	3,731	7,201	352	11111
Brazil	256,200	131,530	115,997	8,673	133
British Guiana	2,387	1.836	449	102	14,246
British Honduras	359	153	204	2	170
Canada	1,786,221	1,355,859	422,946	7,416	31
Chile	64,000	35,200	24,600	4,200	23,864
Colombia	37,817	19,287	14,126	4,404	1,220
Costa Rica	5.525	3,325	1,550	650	347
Cuba	58,354	32,150	22,683	3,521	500
Dominica	220	180		15	1,914
Dominican Republic	5,391	2,664	2,396	331	*****
Dutch Guiana	971	624	239	108	671
Ecuador	8,428	4,683	2,800	945	285
French Guiana	167	67	95	5	95
Grenada	636	480	114	42	30
Guadeloupe	2,300	1.800	500	*	90
Guatemala	6,626	3,523	2,336	767	400
Haiti	3,347	2,222	852	273	462 62
Honduras	2,062	1,469	571	22	20
Jamaica	9,810	7,478	2.198	134	185
Martinique	4.325	2,606		141	247
Mexico	238,150	138,150		15,000	3,881
Montserrat	90	66		20,000	3,001
Netherlands W. I	6.100	5,300		******	9
Newfoundland	9,563	5,870		206	180
Nicaragua	1,489	737		105	134
Panama	16.468	13,275		1.253	450
Paraguay	2,623	1,243			530
Peru	37,584	20,334		2,102	
Puerto Rico	34,731	21,040		597	1,307
St. Kitts-Nevis	291	198			7,001
	285	199			8
St. Lucia St. Pierre-Miguelon	125	55			
St. Vincent		250			*****
El Salvador	4,206	2,836		7	415
		6,251			407
Trinidad and Tobago	9,667				907
Uruguay United States	41,368	27,712		4	*****
	60,882	27,259	30.433	3,190	1,447
Venezuela Virgin Islands		987			1,997
Virgin Islands	1,855	961	030	30	10
Total, 1947	40.397.040	32,782,576			*****
Total, 1947 (Excl. U. S.)	3,069,379	2,113,247	900,429	55,703	53,029
Total, 1946 (Revised)	36,489,324	29,754,533	6,526,374		
Total, 1946 (Excl. U. S.)	2,795,968	1,919,990	776,731	43,207	

## EUROPE

	Motor				Motor-
	Vehicles	*Cars	*Trucks	*Buses	cycles
Aegean Islands	400	225	175	辛	*****
Albania	1,750	500	1,250	+	*****
Austria	51,184	23,115	26,918	1,151	58,097
Azores	868	708	123	37	140
Belgium	202,700	117,200	84.000	1,500	77,000
Bulgaria	9.720	4,750	4,120	850	7,350
Czechoslovakia	93,000	45,000	45.000	3,000	37,000
Denmark	152,833	105,005	46,196	1,632	36,000
Eire	84.759	62,000	21,850	900	4,800
Faroe Islands	90			****	*****
Finland	39,361	11,200	28,161	+	2,500
France	1,640,000	962,018	663,791	14,191	325,000
Germany	371,200	172,000	199,200	+	*****
Gibraltar	1.095	797	234	64	97
Great Britain	2,677,646	1.972.933	645,713	59,000	506.210
Greece	9,962	3,006	6,175	781	1.300
Holland	138,000	68,000	66,000	4,000	79,000
Hungary	21.390	10,100	10.690	600	20,000
Iceland	7.900	4,600	3,000	300	*****
Italy	316,500	145,000	165,000	6,500	60,000
Luxembourg	9,156	5,289	3.799	68	3.165
Malta and Gozo	6,796	4,009	2.244	543	1,053
Monaco	1,500	*****		****	*****
Northern Ireland	55.819	41,456	13.330	1,033	5.368
Norway	99.814	53,730	42.928	3,156	16,982
Poland	63,638	25.065	38.065	508	20,288
Portugal	62,214	42.973	17.961	1,280	5,091
Rumania	26,110	14.560	9.608	1.942	5,367
Spain	111.037	63,220	39.363	8,454	9,605
Sweden	241,600	164.200	71.800	5,600	150.000
Switzerland	118,650	85,500	31,600	1.550	38.000
U.S.S.R. (Russia)	3,000,000	720,000	2,250,000	30.000	*****
Yugoslavia	11,000	****		****	*****
Total, 1947	9,627,683	4,928,159	4,538,294	148,640	1,469,413

<sup>†</sup> Included with trucks.
\* Not complete for all territories.

<sup>†</sup> Included with trucks. \* Incomplete for all territories.

<sup>†</sup> Included with trucks. \* Incomplete for all territories.

## Automotive Wholesalers, Dealers and Repair Shops-by Years\*

(As of January of Each Year)

	Wholesalers	Passenger Car Dealers	Total Truck Dealers	Car and Truck Dealers	Independent Repair Shops	All Retail Outlets‡
1928	3,796		23,869		37,615	105,338
1929	3,912	50,984	24,068		43,863	111,329
1930	4.028	51.560	25,436		47,882	117,493
1931	4,668	47,144	26,137	48.658	53.898	118,713
1932	5,051	42,881	25,952	43,708	58,045	108,147
1933		38,003	23,746	39,370	59.547	103,113
1934		34.069		35,265	65,064	102,456
1935	5.757	35,977		37,238	64,518	105,991
1936	5,905	39,769	23,045	41,201	60,574	105,579
1937		41,288	24.853	43,461	56,423	102,808
1938	5,934	43,747	27,248	46,224	51,709	101,053
1939	6.019	39,936	26,909	41,992	50,406	95,418
1940		39,258	24,575	41,870	49,091	93,764
1941		39,833	24.992	41,790	49,208	95,296
1942	6,631	38,748	32,291	40,537	47,552	93,022
1943	6,130	32,470	27,820	34,270	43,540	80,863
1944	6,101	31,200		33,000	42,166	78,550
1945		30,110	26,370	31,930	41,193	78,498
1946		30,709	27,159	32,439	42,702	81,638
1947	7,328	34,424	29,397	36,354	49,485	91,229
1948	7,982	38,480	25,998†	40,410	55,694	104,504

<sup>\*-</sup>Trade List Department-Chilton Company.

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## Automotive Wholesalers, Dealers and Repair Shops t

As of January, 1948
With Number of Motor Vehicles per Outlet

		Wholesalers				Repair Shops		Shops	Retail Outlet		
	Total Motor		Motor Vehicles	Doggengan		Con and	Motor Vehicles Per	Inde- pendent	Motor Vehicles	All	Motor Vehicles
State	Vehicle Regis- trations	of Whole- salers	Per Whole- saler	Passenge Car Dealers	Truck Dealers	Truck	Car and Truck Dealer	Repair Shops	Repair Shop	Retail Outlets	Per Outlet
Alabama	441,283	129	3,421	429	456	464	951	371	1,189	929	475
Arizona		59	3,083	186	45	201	905	304	598	554	328
Arkansas		120	2,944	477	344	493	717	545	648	1,090	324
California		680	4,760	1,990	1,265	2,084	1,553	5,857	552	8,851	366 333
Colorado		95	4,500	460	330	493	867	719	594 833	1,285 1,450	395
Connecticut	. 573,260	110	5,211	511 66	320 48	542 69	1,058 1,116	688 119	648	212	363
Dist. of Columbia	. 77,067 154,443	19 22	4,056 7,020	68	39	71	2,175	134	1,153	236	654
Florida		147	4,762	554	369	579	1,209	649	1,078	1,318	531
Georgia	. 654.815	157	4,171	639	436	663	988	394	1,661	1,102	594
Idaho		70	2,736	356	250	370	518	391	490	819	234
Illinois	. 2.382.385	445	5,354	2.267	1.462	2.366	1.065	3,262	730	6.122	389
Indiana	. 1.144.199	225	5.085	1,138	762	1.185	966	1,440	794	2,712	422
Iowa		202	4,002	1,196	881	1,278	633	1,153	701	2,688	301
Kansas	703,003	147	4,782	886	625	914	769	765	919	1.734	405
Kentucky	. 518,000	136	3,809	636	444	665	779	363	1,426	1,187	436
Louisiana	477,546	97	4,923	397	297	414	1,153	437	1,092	879	543
maine	. 239,440	54	4,434	353	255	371	645	609	393	975	245
Maryland	. 522,521	87	6,006	407	265	431	1,212	442	1,182	906	577
Massachusetts	. 1,040,035	215	4,837	1,103	642	1,142	911	1,427	729	2,833	367
Michigan	. 1,824,587	322	5,666	1,801	1,201	1,851	986	3,221	567	5,589	326
Minnesota	. 876,451	152	5,766	1,413	1,052	1,472	595	1,560	562	3,398	257
Mississippi	. 334,730	96	3,487	453	323	482	694	218	1,535	703	476
MISSOuri	. 1.046.900	243	4,308	1,048	715	1,106	946	1,334	785	2,626	399
Montana	. 195,654	60	3,261	393	301	423	462	268	730	776	252
Meoraska	. 472,350	110	4,294	621	462	654	722	699	676	1,470	321
Nevada	. 56,508	14	4,036	97	71	103	549	121	467	258	219
new Hampshire	. 143,284	36	3,980	216	137	222	645	273	525	513	279
New Jersey	. 1,219,047	221	5,516	965	572	1,022	1,193	2,098	581	3,351	364
New Mexico	. 155,882	61	2,555	231	145	243	641	340	458	607	257
New York	. 2,862,347	532	5,380	2,500	1,599	2,660	1,076	5,334	537	8,938	320
North Carolina	. 760,168	191	3,980	794	574	821	926	740	1,027	1,671	455
North Dakota	. 213,308	47	4,538	427	317	442	482	421	507	927	230
Ohlo	. 2,175,284	426	5,106	1,950	1,198	2,045	1,064	2,683	811	4,979	437
Oklahoma	. 612,790	166	3,691	729	523	779	787	975	628	1,978	310 270
Oregon	. 522,500	123	4,248	519	341	543	962	1,101	474 519	1,933 8,621	285
Pennsylvania	. 2,455,146	511	4,804	2,913	1,772	3,055	804	4,726	769	462	447
Rhode Island	. 206,759	34 88	6,081	139 396	80	145 412	1,426 997	269		711	578
South Carolina	. 410,744	38	4,667 5,759	353	262 271	368	595	331 294	1,240 744	712	307
South Dakota	588,000	143	4,112	461	351	486	1,210	454	1,295	1.008	583
Tennessee	2,052,500	491	4.180	2,072	1.440	2,212	928	3.189	644	5,551	370
Utah	. 183,831	60	3,064	212	149	227	810	306	601	593	310
Vermont Vivalut	108,119	21	5,148	176	127	186	581	239	452	450	240
Virginia	. 664,838	114	5,832	719	489	751	885	749	888	1,672	398
Washington	738,100	167	4,420	776	484	817	903	1,902	388	2,873	257
West Virginia	. 324,236	82	3,954	459	331	490	662	427	759	1,018	318
Wisconsin	976,937	185	5.281	1.337	1.032	1,399	698	1,218	802	2,873	340
Wyoming	100,521	32	3,142	191	144	199	505	135	745	361	278
			3,444		444	733	303	100	123	201	416
Total	37,327,661	7,982	4,676	38,480	25,998	40,410	924	55,694		104,504	357

<sup>†—</sup>Trade List Department—Chilton Company.

"All Refail Outlets include Passenger Car and Truck Dealers, Independent Repair Shops, Super Service Stations and Wrecking and Body Establishments.

<sup>†-</sup>Reduction in truck dealers caused by discontinuance of Plymouth truck production.

<sup>‡—</sup>Includes Car and Truck Dealers, Independent Repair Shops, Super Service Stations and Wrecking and Body Establishments, duplications eliminated.



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## Car Dealer Franchises by Makes by Population Groups\*

As of January, 1948

	POPULATION DIVISION										
,	0-1,000	1,000- 2,500	2,500- 5,000	5,000- 10,000	10,000- 25,000	25,000- 50,000	50,000- 100,000	Over 100,000	Total Franchises		
Buick Gadillac Chevrolet. Chrysler. De Soto. Dodge Ford Hudson Kaiser-Frazer Lincoln-Mercury Nash Oldsmobile	146 12 1,907 431 384 499 1,585 233 253 304 59 172 43	374 34 1,860 547 413 778 1,875 263 365 346 78 428 98	426 83 1,100 503 345 673 1,076 325 315 255 108 475 163	505 162 779 493 389 643 776 359 291 284 185 469 301	431 267 585 472 442 516 560 392 284 301 314 463 346	179 130 213 173 180 186 193 156 109 130 155 182	107 76 127 107 108 109 129 102 81 99 93 115	183 107 415 310 290 266 426 314 191 227 169 229 178	2,351 873 6,986 3,036 2,549 3,670 6,820 2,144 1,889 1,946 1,181 2,533		
Packard Plymouth Pontiac Studebaker Willys Miscellaneous	1,304 278 228 123 10	1,748 547 239 149 23	1,521 525 249 145 23	1,515 536 329 182 32	1,433 450 372 213 51	529 180 165 109 24	322 97 109 75	864 241 223 160 28	1,344 9,236 2,854 1,914 1,156 202		
Totals	7,971	10,165	8,310	8,230	7,892	3,133	1,942	4,821	52.464		

<sup>\*</sup> Trade List Department-Chilton Company.

## 81% of Dealers in Towns Under 25,000

Car Dealer Franchises, by States, by Population Groups\*

POPULATION DIVISION

				PUPULATION	DIVISION				
STATES	0-1000	1,000- 2,500	2,500- 5,000	5,000- 10,000	10,000- 25,000	25,000- 50,000	50,000- 100,000	Over 100,000	Total Dealer Representation
Alabama	46	138	103	101	83	60	20	0.6	200
Alabama					83	50	38	34	593
Arizona	20	62	51	103	* * * *	19	23	* * * *	278
Arkansas	59	122	176	129	94	23	19		622
California	183	396	472	457	429	215	155	387	2.694
Colorado	96	154	99	104	85	17	18	65	638
Colorado			77						
Connecticut	36	72		87	184	112	55	67	690
Delaware	15	24	30	12				23	104
District of Columbia			477.6	44	****	****	1100	91	91
Florida	30	101	161	119	185	54	18	76	744
Canadia	58	192	169	155	179		51		
Georgia	30	102	103	133	11.0	21	01	46	871
Idaho	67	106	142	41	111	19	****	****	486
Illinois	394	557	385	464	-381	220	122	408	2.931
Indiana	186	268	194	288	229	135	63	119	1.482
Lows	420	412	270	234	138	90	70	28	1.662
lowa		272	220						
Kansas	254			159	234	16	14	44	1,213
Kentucky	127	264	166	94	60	78	13	56	858
Louisiana	56	121	113	117	38	43	21	30	539
Maine	60	80	91	120	84	28	21	9.9	484
Mandand	197	92	87	13	70		21	409	597
Maryland						31	*444	107	
Massachusetts	46	97	144	223	417	176	116	266	1,485
Michigan	428	535	273	315	296	158	128	329	2,462
Minnesota	533	500	231	258	173	16	6	143	1.860
Adjectecioni	60	158	128	86	149	15	18	140	614
Mississippi		318	207	210	186		37	400	1,425
Missouri	263					21	31	183	
Montana	121	135	81	108	70	24	****		539
Nebraska	267	220	118	91	97		19	42	854
Nevada	28	43	27	20	19		****	****	137
Now Homobies	30	71	52	32	90	29	27		331
New Hampshire	90		156					404	1.337
New Jersey		143		273	289	159	88	131	
New Mexico	41	45	66	107	77	21	****	* * * *	357
New York	493	553	537	384	498	161	165	625	3.416
North Carolina	126	262	178	164	231	67	74	26	1.128
Month Delecte	274	159	21	80	49	19		20	602
North Dakota							****	****	2.667
Ohio	337	422	360	435	396	215	61	441	
Oklahoma	58	221	173	231	221	37	****	46	987
Oregon	97	119	150	138	99	22		53	678
Pennsylvania	559	559	580	764	745	174	193	371	3.945
Phode Island	19	22	18	12	28	41	15	46	201
Rhode Island									553
South Carolina	42	118	115	117	87	39	35	* * * *	
South Dakota	159	133	62	32	75	15	****	****	476
Tennessee	68	113	160	125	75	13		91	645
Toyon	229	623	666	636	349	138	119	139	2.899
Texas			84						317
Utah	32	65		35	35	20	4.6.63	26	
Vermont	41	64	35	58	26	21	****	8.8 4.8	245
Virginia	282	183	119	99	84	80	56	59	962
Washington	220	196	203	74	142	60		127	1.022
Washington,			85				40		640
West Virginia	96	164		127	86	34	48	3.144	
Wisconsin	571	366	244	170	154	187	36	96	1,824
Wyoming	49	105	31	29	65	****	****		279
Totals	7,971	10,165	8,310	8,230	7,892	3,133	1,942	4,821	52,464
Per Cent of Total-1948	15.19%	19.38%	15.84%	15.89%	15.04%	5.97%	3.70%	9.19%	100.00%
Per Cent of Total—1942	17.45%	19.68%	15.54%	14.58%	13.63%	5.86%	3.58%	9.68%	100.00%

<sup>\*</sup> Trade List Department-Chilton Company

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## CAR DEALERS



## Car Dealer Franchises by Makes, by Years\*

(As of January of Each Year)

NOTE — The term
"Passenger Car
Franchises' refers to
retail outlets of any
given make. A dealer organization often
handles more than
one make of passenger car.

	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1948
Buick	2,608	2,472	2,273	2,303	2,465	2,516	2,750	2,657	2,572	2,491	2,544	2,351
Cadillac	654	602	563	541	649	648	803	695	710	694	748	873
Chevrolet	9,412	9,039	8,885	8,578	8,667	8,776	8,752	8,406	8,100	7,962	7,795	6.986
Chrysler	3,454	2,999	3,511	4,360	4,309	4,097	3,837	3,383	3,276	3,328	3,333	3,036
De Soto	1.234	1,252	1.359	1,880	3,406	2.888	2,926	2.688	2,512	2,469	2,465	2,549
Dodge	2.663	2,722	2,772	3.297	3.772	4.087	4,380	4,113	3,959	3.733	3.883	3,670
Ford	8.735	8,280	7,480	7,388	7,948	8,301	8,245	7,825	7,404	7,158	7,034	6,620
Graham	1.206	1,079	920	782	1.120	958	877	611	460			
Hudson	2.270	1,761	1,842	2,641	3.023	3,263	3,390	2,681	2.436	2,667	2.342	2,144
Hupmobile	991	854	699	763	771		302	191		-,		
Kaiser-Frazer						****			****		****	1,889
Kaiser-Frazer	****	****	****	****	****	****	****	1,695	2,211	2,356	0 510	1,009
Lincoln-Zephyr				****		*****			2,211	2,300	2,516	1 040
Lincoln-Mercury		* * * * *			****		* * * * *	* * * * *	0.110	0.000	4 000	1,946
Mercury	2122	4 400	4 004	4 000	4 400	4 044	4 750	4 500	2,116	3,655	4,300	4 444
Nash	1,677	1,430	1,201	1,283	1,400	1,314	1,753	1,533	1,756	1,775	1,792	1,161
Oldsmobile	1,426	1,351	1,418	1,611	2,227	2,454	2,588	2,493	2,424	2,449	2,543	2,533
Packard	682	624	540	486	843	1,128	1,283	1,098	1,031	1,131	1,117	1,344
Plymouth	7,351	6,276	7,642	9,537	11,487	11,072	11,143	10,184	9,747	9,530	9,670	9,236
Pontiac	2,887	2,503	2,336	2,314	2,791	3,413	4,006	3,411	3,439	3,370	3,370	2,854
Studebaker	1.999	1,927	1.733	1,986	1.832	2,080	2,335	1,873	2,480	3,316	2,792	1,914
Willys Overland	2.904	2,739			****	580	1,476	1,143	913	1,584	1,298	1,156
				-	-		-			-		
Total	52.153	47.910	45,174	49.750	56.710	57.575	60.846	56.680	57,546	59.668	59.542	52,282
Miscellaneous	7.020	5,527	4.854	3,852	3.046	1,779	2,289	366	488	628	161	202
	.,020	-,001		-,002	-,010		-,200					
Total Representations.	59,173	53,437	50,028	53,602	59,756	59,354	63,135	57,046	58,034	60,296	59,703	52,464

## Car Dealer Franchises by States by Makes\*

STATES	Buick	Cadillac	Chevrolet	Chrysler	De Soto	Dodge	Ford	Hudson	Kaiser- Frazer	Lincoln- Mercury	Nash	Oldsmobile	Packard	Plymouth	Pontiac	Studebaker	Willys	Miscellaneous	Total Franchises
Alabama Arkansas Salifornia Solorado Sonnecticut Delaware District of Columbia Florida	22 16 19 144 32 38 6 2 28 35	5 8 7 62 14 21 1 1 15	101 37 83 259 89 82 14 6	29 13 34 141 43 37 5 8 41 53	25 9 37 147 25 30 3 4 35 34	42 24 49 190 42 40 11 5 57 72	99 32 99 270 79 68 13 12 94 137	31 10 18 136 34 35 1 7 27 25	19 9 31 97 17 17 18 4 4 42 31	19 11 22 110 27 26 5 5 27 29	12 7 11 56 13 17 2 2 12	24 14 19 141 30 35 6 3 37 35	8 6 13 111 14 25 1 4 25 17	96 46 120 478 108 107 19 17 133 159	24 14 26 136 35 50 9 4 28 36	16 18 19 136 23 28 2 3 24 21	16 4 13 71 11 17 4 2 17 26	5 2 9 2 10 2 3	593 278 622 2,694 638 690 104 91 744
Idaho Illinois Indiana Iova Kansas Kentucky Luisiana Maine Maryland Massachusetts	21 151 79 93 46 36 15 15 26 54	12 42 24 16 13 13 7 10 9	53 376 192 269 194 128 80 72 62 152	21 167 80 97 73 50 32 23 41 97	21 122 73 80 54 45 16 19 38 87	39 186 102 118 94 69 50 30 35 82	51 395 184 254 173 125 87 64 72 136	23 129 71 58 42 23 13 28 25 75	19 146 70 43 35 31 16 14	29 100 46 49 51 18 30 25 40 53	11 72 23 24 25 11 6 11 17 43	27 154 67 71 55 35 24 20 32 95	11 96 44 32 23 27 7 11 12 50	81 475 255 295 221 164 98 72 114 256	23 150 77 78 70 48 28 35 26	25 110 60 57 35 22 14 13 29 77	12 53 28 26 8 11 13 20 8	7 7 7 2 1 2 3 2	486 2,931 1,482 1,662 1,213 858 539 484 597 1,485
Michigan Minnesota Missouri Missouri Montana Nebraska New Harsey New Hersey New Jersey New Mexico	114 91 25 48 17 36 9 15 54 20	33 27 7 14 11 7 9 32 6	319 302 101 224 78 160 12 45 135 45	104 119 43 91 26 58 6 15 88 24	115 95 31 79 18 32 7 16 77	160 119 48 105 40 49 9 23 95 26	295 284 103 194 68 134 19 39 116 35	131 62 10 31 19 24 6 18 57	135 46 11 41 44 44 48 6 48	109 50 21 54 22 36 8 26 56	62 52 10 29 14 12 3 10 39 7	130 71 16 62 25 27 3 19 70 26	57 35 13 21 16 16 6 8 39	379 333 112 285 84 137 22 54 260 66	146 81 35 78 25 36 7 17 77	83 71 15 39 19 31 7 7 7 59	75 18 12 29 12 16 2 4 29	15 4 1 1 1 1 1 1	2,462 1,860 614 1,425 538 854 137 331 1,337
New York North Carolina North Dakota Ohlo Ohlo Oklahoma Oregon Pennsylvania Rhode Island South Carolina South Dakota	142 50 23 135 46 24 178 5 23	78 20 5 51 16 14 71 3 13	385 155 112 340 145 83 425 23 88 84	204 62 40 155 42 35 259 14 30	164 38 33 155 59 38 206 14 22 21	241 79 38 171 80 44 260 14 43 36	352 167 94 301 144 68 406 15 76	163 36 16 118 23 28 197 8 19	101 20 14 89 38 46 157 4 15	99 86 17 67 38 26 105 8 18 31	87 18 8 51 17 19 120 8 7	189 55 20 142 44 28 194 14 28 16	106 36 5 78 18 17 113 5	609 179 114 481 181 117 715 42 95 74	223 68 20 170 59 39 231 12 30 22	151 37 27 95 16 27 181 8 17	104 17 15 58 21 20 101 3 9	18 5 1 10 5 28 1	3,416 1,126 602 2,667 987 678 3,941 207 553 478
Tennessee Texas. Utah. Vermont Virginia Washington West Virginia Wisconsin Wyoming.	28 136 12 11 34 40 24 102	10 43 8 7 12 16 6 17	108 386 36 35 130 109 80 323 36	31 191 20 16 59 61 40 89	28 153 19 9 50 42 30 67	52 240 21 14 67 73 43 114 24	94 352 43 30 151 120 74 266 38	16 111 12 9 28 42 30 82 14	13 78 6 9 34 81 22 33 6	36 82 15 8 34 33 23 89	16 46 6 5 13 27 14 56 5	22 151 18 13 38 48 29 97	11 65 3 8 22 29 19 24 4	111 584 60 39 176 176 118 270 49	36 135 15 19 61 53 28 101 15	22 69 10 8 31 38 23 56 13	7 68 13 5 16 27 28 35 5	4 9 6 7 4 3	2,899 317 249 963 1,023 640 1,824
Totals	2,351	873	6,986	3,036	2,549	3,670	6,620	2,144	1,889	1,946	1,161	2.533	1,344	9,236	2,854	1,914	1,156	202	52,4

 $<sup>^{\</sup>bullet}$  Trade List Department — Chilton Compar y

## 1948 TRUCK FLEET CENSUS

## Total Vehicles in Fleets of 8 or more Trucks

Passenger Cars &							Passenger Cars &						
			Trail-	Taxi-		Ve-				Trail-	Taxi-		***
State	*Fleets	Trucks	ers	Cabs	Buses	hicles	State	*Fleets	Trucks	ers	Cabs	Buses	Ve-
Alabama	. 298	11,671	1,839	3,300	5,879	22,689	Nevada	. 32	1,095	231	411		
Arizona	0.5	3,487	951	1,144	171	5,753	New Hampshire		2,802	409	573	55 96	1,792
Arkansas	444	5,293	856	994	287	7,430	New Jersey		33,810	7,070	7,194		3,880
California	. 1,546	91,415	16,898	28,173	5,771	142,257	New Mexico		3,031	296	889	5,634	53,708
Colorado	. 264	13,956	1,578	2,842	518	18,894	New York	2,201	149,245	10,888	25,641	13,775	4,522
Connecticut	. 467	12,483	2,648	2,475	1,318	18,924	N. Carolina	****	20,100	3,260	2,211	9,564	199,549
Delaware	. 81	2,812	531	1,118 -	80	4,541	N. Dakota	. 64	1,498	178	357	21	35,135
Dist. of Col		22,771	1,700	6,686	1,287	32,444	Ohio	. 1,528	57,785	15,833	12,224	3,981	2,054
Florida		11,972	1,803	2,569	2,853	19,197	Oklahoma	. 318	16,279	3,689	6,480	769	89,823 27,217
Georgia	. 375	20,842	2,236	3,177	1,068	27,323	Oregon	. 281	10,714	1,980	2,676	677	16,047
Idaho		3,268	476	841	66	4,651	Pennsylvania		77,979	12,266	22,191	4,006	116,442
Illinois		68,286	17,716	17,542	2,308	105,852	Rhode Island		6,207	1,009	1,777	924	9,917
Indiana		23,585	7,313	4,100	1,008	36,006	S. Carolina	. 190	5,708	753	1,177	281	7,919
Iowa		10,536	2,046	2,429	692	15,703	S. Dakota	. 69	2,156	368	457	82	3,063
Kansas		10,608	1,651	1,889	269	14,417	Tennessee		17,298	2,357	5,481	1,689	26,825
Kentucky		9,444	1,152	2,336	1,444	14,376	Texas	. 957	36,996	8,024	11,906	3,484	60,410
Louisiana		12,171	1,630	3,812	1,275	18,888	Utah	. 126	4,468	776	867	562	6,673
Maine		4,763	495	906	252	6,416	Vermont	. 42	1,001	257	188	100	1,546
Maryland		17,245	3,227	4,090	629	25,191	Virginia	. 430	21,986	2,567	3,197	2,268	30,018
Massachusetts		38,536	5,374	9,040	3,417	56,367	Washington		15,686	2,399	4,064	1,290	23,439
Michigan		42,478	13,384	13,106	5,517	74,485	West Virginia		9,233	844	1,804	2,244	14,125
Minnesota		17,891	3,077	4,824	1,770	27,562	Wisconsin		21,001	4,735	3,900	926	30,562
Mississippi		3,977	611	583	408	5,579	Wyoming	. 54	1,378	280	457	30	2,145
Missouri		29,633	6,584	5,323	2,654	44,194							-,
Montana		4,308	586	702	285	5,881	TOTALS		1,018,734	178,555	241,981	94,660	1,533,930
Nebraska	. 234	7,847	1,724	1,858	670	12,099	* Includes exclusive	bus an	d taxi-cal	fleets.			June

## 1948 Census of Truck Fleets Operating 8 or More Trucks

## Showing Number of Fleets and the Trucks, Trailers and Passenger Cars They Operate-by States

FLEETS OPERATING 28	TOTALS	14,749	191,274	33,741	46,951	4,777	161,976	34,904	33,774	2,359	158,886	35,983	31,006	1,660	506,598	74,017	116,379
State		-		193	103	13	341	114	199	- 2	108	14	24	2	259	49	01
Fig.	Wyoming	392															1,128
FLEETS OPERATING 25																	539
Fleets Operating																	
FLEETS OPERATING 18			-,		-	,	-,						200	30	40,440		
FLEETS OPERATING 8	Virginia	266															
FLEETS OPERATING 8	Vermont																
FLEETS OPERATING 8	Texas	555															
State	Tennessee	241															
FLEETS OPERATING 8								_00			-200	240	6.8	9	000		
Paste	S. Dakota	41															
FLEETS OPERATING 8	S. Carolina	101															
FLEETS OPERATING 8		1,470															
Pastro   P	Oregon	163															
Paster   P												401	310	21	3,143	mybox	
FLEETS OPERATING 8																	
FLEETS OPERATING 8														400	25 992	7 059	
FLEETS OPERATING 8														32	11,017	1,620	
FLEETS OPERATING 8																	
FLEETS OPERATING 8   FLEETS OPERATING 25   TO 49 TRUCKS   TO 99																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8	New Homeshire	17															
FLEETS OPERATING 8																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8   FLEETS OPERATING 25   FLEETS OPERATING 25   TO 99 TRUCKS & OVER	Mindesota																
FLEETS OPERATING 8																	
FLEETS OPERATING 8	ALEMANDO LE MANTEN														,	49100	
FLEETS OPERATING 8																	
FLEETS OPERATING 8																	
FLEETS OPERATING 8	Louisiana	267															
FLEETS OPERATING 8  TO 24 TRUCKS  Pas- State  Fleets Trucks ers  Cars  Fleets Trucks  Fleets Tru																	
FLEETS OPERATING 8 TO 24 TRUCKS  Pas- State Fleets Trucks ers Cars Fleets Trucks ers Cars Fleets Trucks Fleets Tru	Mansas	169	2,213	941	101	31	1,033	203	314	20	4,440	236	101	22	3,446	413	913
FLEETS OPERATING 8  TO 24 TRUCKS  Pas- Trail- senger State  Fleets Trucks ers Cars  Fleets Trucks ers																	
FLEETS OPERATING 8  TO 49 TRUCKS  Trail- senger  Trail-																	
FLEETS OPERATING 8  TO 49 TRUCKS  Pas- Trail- Senger  State  Fleets Trucks ers Cars  Fleets Trucks ers	Illinois	942															
FLEETS OPERATING 8  TO 49 TRUCKS  TO 49 TRUCKS  TO 49 TRUCKS  Trail- senger  State  Fleets Trucks ers Cars  Fleets Trucks  Fle	Idaho	36	421	81	81	17	552	120	104	6	370	83	68	6	1,925	192	588
FLEETS OPERATING 8 TO 24 TRUCKS  Pas- Trail- senger State Fleets Trucks ers Cars Fleets Trucks ers Cars Fleets Trucks  Fleets	Georgia	233	3,026	413	649	12	2,409	348	300	33	2,185	363	976	31	13,172	1,132	1,006
FLEETS OPERATING 8 TO 24 TRUCKS  Pas- Trail- State Fleets Trucks ers Cars Fleets Trucks ers Cars Fleets Trucks Fleets Fleets Trucks Fleets Fleets Trucks Fleets Fleets Trucks Fleets Fle																	
FLEETS OPERATING 8  FLEETS OPERATING 25  TO 49 TRUCKS  Pas- Trail- Senger  Trail- Senger  Fleets Trucks ers Cars  Fleets Truck	Dist. of Col	90															
FLEETS OPERATING 8  TO 24 TRUCKS  Pas- Trail- State Fleets Trucks ers Cars Fleets Trucks ers Cars Fleets Trucks  Fleets Trucks								175									
FLEETS OPERATING 8  TO 24 TRUCKS  Pas- Trail- Senger State  Fleets Trucks ers  Cars  Fleets Truc	Connecticut	318	3,949	687	746	93	3,093	715	617	33	2,165	423	345	13	3,276	823	767
FLEETS OPERATING 8  TO 24 TRUCKS  Pas- Trail- Senger  State  Fleets Trucks ers  Cars  Fleets Tru	Colorado	168	2,264	338	659	47	1,533	280	346	23	1,628	191	295	19	8,531	769	1,542
FLEETS OPERATING 8	California	781	10,678														
FLEETS OPERATING 8 TO 24 TRUCKS  Pas- Trail- senger State Fleets Trucks ers  Cars Fleets Trucks ers  FLEETS OPERATING 50 TO 99 TRUCKS  FLEETS OPERATING 50 TO 99 TRUCKS  Fleets Trucks Fleets Trucks ers  F						33	1,166	273	209	11							
FLEETS OPERATING 8 TO 24 TRUCKS  Pastrall- Trail- Senger Trail- Fleets Trucks ers  FLEETS OPERATING 50 TO 99 TRUCKS  FLEETS OPERATING 100  A OVER  Pastrall- Senger Trail- Fleets Trucks ers Fle																	
FLEETS OPERATING 8 TO 24 TRUCKS  Pas- Trail- senger  FLEETS OPERATING 50 TO 99 TRUCKS  FLEETS OPERATING 100 TO 99 TRUCKS  FLEETS OPERATING 100 TO 99 TRUCKS  FAS- Trail- senger  Trail- senger  Fas- Trail- senger  Trail- senger						61	2 001	261	429	25	1 725						
FLEETS OPERATING 8 TO 24 TRUCKS  Pas-  FLEETS OPERATING 25 TO 49 TRUCKS  FLEETS OPERATING 50 TO 99 TRUCKS  FAS-  Pas-  Pas-  Pas-	State	Floris	Trucks			Fleets	Trucks			Fleets	Trucks			Fleets	Trucks		
FLEETS OPERATING 8 FLEETS OPERATING 25 FLEETS OPERATING 50 FLEETS OPERATING 100 TO 24 TRUCKS TO 39 TRUCKS & OVER				TwoII.				Trall.				Troil.				/Dwo!!	
FLEETS OPERATING 8 FLEETS OPERATING 25 FLEETS OPERATING 50 FLEETS OPERATING 100			I U AT I	neck.			10 20 1	ALC CALL			10 33 1	ne can			a U	V.E.D.	
		FLE								FLE				FLEI			N G 100
Snowing number of Fleets and the Trucks, Italiers and rassenger Cars They Operate—by States													-	-			

Source: Commercial Car Journal, A Chilton Publication.

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## 92% of 1947 New Truck Sales Under 16000 G.V.W.

## New Truck Registrations by Makes, by Gross Vehicle Weight\*

Make		5,000 or less	5,001- 10,000	10,001- 14,000	14,001- 16,000	16,001- 19,500	19,501- 26,000	26,001- and over	Total
AUTOCAD	1947				* * * * *			4,334	4,334
AUTOCAR	1946						2,033	2,722	4,755
BROCKWAY	1947	****		5	574 896	120 22	2,437 1,859	1,124 901	4,255 3,683
CHEVROLET	1947 1946	87,648 73,097	40,252 6,980	25,888 42,533	82,015 49,008				235,803 171,618
DIAMOND T	1947 1946		945 100	2,643 948	4,704 $2,691$	$\frac{1,271}{900}$	390 221	522 233	10,475 5,093
DIVCO	1947 1946		3,636 2,942	1,257 792		* * * * *	****		4,893 3,734
DODGE	$\begin{cases} 1947 \\ 1946 \end{cases}$	36,719 43,482	32,138 11,831	35,407 29,688	17,772 11,246	3,014 202	1,686 41	* * * * *	126,736 96,490
FEDERAL	1947 1946			1,068 376	3,143 3,070	213	997 561	599 550	6,020 4,557
FORD	1947 1946	46,365 53,509	33,533 13,271	85,057 62,079	21,459 2,610				186,414 131,469
F. W. D.	1947 1946		****			140 35	699 142	356 408	1,195 585
G. M. C.	1947 1946	13,511 7,991	8,016 65	16,693 10,574	3,883 1,625	3,577 2,602	1,743 723	1,764 $2,065$	49,187 25,645
HUDSON	( 1947 ( 1946	2,534 2,543						* * * *	2,534 2,543
INTERNATIONAL	1947 1946	20,925 $10,799$	$27,044 \\ 20,926$	32,301 27,860	12,484 $4,590$	11,005 7,002	5,918 5,475	3,474 1,740	113,151 78,392
KENWORTH	1947 1946	* * * * *	****		* * * * *	* * * *		487	487
MACK	( 1947 ( 1946	* * * * *		1 20	1,373 1,083	1,671 75	5,215 2,317	2,657 1,252	10,917 4,687
OSHKOSH	1947	* * * * *			****	****	17	228	245
PETERBUILT	1947			****				195	195
CILIDOILI	1946	*							*****
REO	1947			7,017 5,005	1,777 $3,775$	$\frac{2,280}{401}$	1,065 448	772 860	12,911 10,489
STERLING	(1947 ) 1946		****				46 14	530 496	576 510
STUDEBAKER	(1947 ) 1946	20,271 10,031	6,271 4,941	12,366 2,401	2,953 6,926			1,061	41,861
	(1947		.,	2,101	0,020	****	56	453	25,360 509
WARD LA FRANCE	1946		****	*					
WHITE	1947			899 1,369	399 30	1,828 1,483	8,534 5,343	1,426 1,892	13,086 10,117
WILLYC	(1947	48,427	1,392		* * * * *				49,819
WILLYS	1946	42,135	4		****	*155		****	42,135
ALL OTHERS	1947 1946	1,851 219	416 36	$\frac{204}{124}$	13 27	210 97	273 232	562 2,652	3,529 3,387
TOTAL	( 1947 ) 1946	278,251 243,806	153,643 61,092	220,801 183,774	152,549 87,577	25,329 12,759	29,076 19,409	19,483 16,832	879,132 625,249
PER CENT OF TOTAL	§ 1947 § 1946	31.65% 38.99%	17.48% 9.77%	25.12% 29.39%	17.35% 14.01%	2.88%	3.30% 3.10%	2.22%	100.00%

<sup>\*</sup> Data from R. L. Polk & Co.

ES

## New Passenger Car Registrations by Makes, by Years\*

Make of Car	1947	1946	1941	1940	1939	1938	1937	1936
Chrysler	93,871	65,532	143,025	100,117	63,956	46,184	91,622	58.698
De Soto	72,966	54,420	91,004	71,943	51,951	35,259	74.424	45.088
Dodge	209,552	135,488	215.563	197,252	176.585	104,881	255,258	248,518
Plymouth	313,118	211,800	452,187	440,093	348,807	286,241	462,268	499,580
Total-Chrysler Corp.	689,507	467,240	901,779	809,405	641,299	472,565	883,572	851,884
Ford	532,646	326,822	602,013	542,755	481,496	363,688	765,933	748.554
Lincoln	24,081	10,798	18,769	21,004	19,940	16,991	25,243	15,567
Mercury	111,198	61,187	81,874	80,418	65,884	6,835	*****	
Total-Ford Motor Co	667,925	398,807	702,656	644,177	567,320	387,514	791,176	764,121
Buick	246,115	126,322	308.615	295,513	218,995	166,380	205.297	160,687
Cadillac-La Salle	53,379	23,666	60,242	38,564	35,287	26,371	40,140	25,758
Chevrolet	640,709	329,601	880.346	853,529	598,341	464.337	768,040	930,250
Oldsmobile	180,078	93,094	230,367	201,256	146,412	92,398	188,306	178,488
Pontiac	206,411	113,109	286,123	235,815	159,836	98,399	212,403	171,669
Total-General Motors Corp.	1,326,692	685,792	1,765,693	1,624,677	1,158,871	847,885	1,414,186	1,466,852
Crosley	15,934	2,868	*****		******		*****	******
Frazer	51,158	1,873						
Hudson-Terraplane	83,344	72,484	73,261	79,979	62,855	40,889	90,043	99,296
Kaiser	55,571	3,501						
Nash	102,808	85,169	77.824	52.853	54.050	31.814	70.571	43.070
Packard	47.875	36,435	69,653	73.794	62,005	49,163	95,455	68,772
Studebaker	102,123	58.051	114,331	102,281	84,660	41,504	70.048	67,835
Willys	23,400	2,329	22,102	21,418	14,734	13,012	51,411	12,423
All Others	894	647	3,867	7,321	7,583	6,675	17,290	30,244
Total Independents	483,107	263,357	361,038	337,646	285,887	183,057	394,818	321,640
Total—All Makes	3,167,231	1,815,196	3,731,166	3,415,905	2,653,377	1,891,021	3,483,752	3,404,497

<sup>\*--</sup> R. L. Polk & Co.

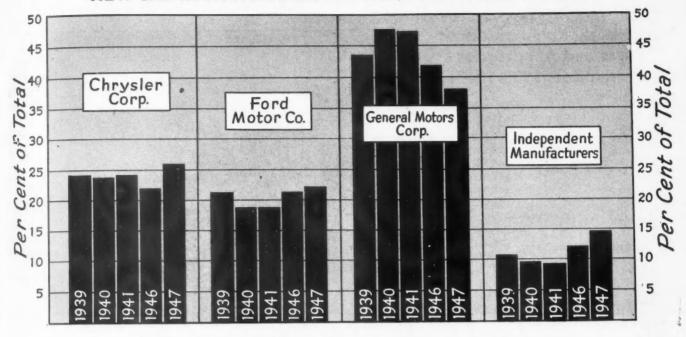
## New Truck Registrations by Makers, by Years\*

MAKE	1947	1946	1941	1940	1939	1938	1937	1936
AutocarBrockway	4,344 4,255 235,803	4,755 3,683 171,618	2,510 2,294 212,797	1,955 1,672 194,038	2,044 1,815 169,457	1,617 1,303 119,479	2,181 1,593 183,674	1,451 1,695 204,344
Diamond T	10,475 4,893	5,093 3,734	6,077 2,306	6,358 1,662	5,412 1,481	4,393 1,229	8,118 1,125	8,750 964
Dodge	126,736	96,490	62,925	54,615	48,049	33,656	64,098	85,295
Federal	6,020 186,414	4,557 131,469	1,611 174,024	1,617 162,333	1,837 128,889	1,370 100,959	2,339 189,376	2,930 177,244 369
F. W. D	1,195 49,187 2,534	585 25,645 2,543	280 45,703 736	252 42,486 761	34,908 409	274 20,152 719	435 43,522 4,823	26,980 1,905
International	113,151	78,392	92,482	77,891	66,048	55,836	76,174	71,958
Kenworth	487	4.007	0.400	7.754	0.070	4.400	F 540	4,226
MackOshkosh	10,917 245	4,687	9,468	7,754	6,670	4,406	5,513	
Peterbuilt	195	28	7,732	9,573	8,294	6,652	13,709	2,420
Reo Sterling	12,911 576	10,489 510	1,543 400	625 341	853 326	2,929 267	4,254	4,227
Studebaker	41,861 509	25,360	5,078	1,207	2,110	2,000	5,129	3,279
White Willys Truck	13,086 2,207	10,117	9,271 2,031	7,344 2,291	4,558 1,634	3,514 1,889	5,933 1,122	5,75° 2,44°
Willys Jeep	47,612 3,529	42,135 3,359	1,429	1,552	1,772	2,705	4,820	5,13
Total	879,132	625,249	640,697	576,327	486,748	365.349	618,249	611,64

<sup>\*</sup>Data from R. L. Polk & Co.

## CARS AND TRUCKS

## **NEW CAR REGISTRATIONS BY MANUFACTURING GROUPS**



## New Motor Vehicle Registrations by States\*

	Non	Passenger C	ars-		New Trucks		-Total-	New Motor Ve	hicles-
State	1947	1946	1941	1947	1946	1941	1947	1946	1941
	25 500	21,850	42,453	17,615	15,705	15,260	53,123	37.555	57,713
Alabama	35,508		11,603	4,811	3,424	3,468	15,466	9,135	15,071
Arizona	10,655	5,711			10.598	13,636	34,349	21,415	37,509
Arkansas	19,786	10,817	23,873	14,563					316,102
California	253,341	136,419	276,649	58,653	41,437	39,453	311,994	177,856	316,102
Colorado	25,958	13,346	28,054	9,490	5,412	6,502	35,448	18,758	34,556
Compations	48,782	27,797	64,606	8,665	6.089	7,735	57.447	33,886	72,341
Connecticut			11.371	2,733	1.746	1,983	11,579	6,989	13,354
Delaware	8,846	5,243				2,906	26.485	16,228	33,092
Dist. of Col	23,186	14,048	30,186	3,299	2,180				69,795
Florida	49.009	26.680	57,598	18,383	13,412	12,197	67,392	40,092	
Georgia	53,432	25,102	59,300	20,499	13,446	15,742	73,931	38,548	75,042
Idaho	12.093	6,106	13,842	6,110	3,643	4,359	18,203	9,749	18,201
Illinois	218,536	122,081	274.142	45,457	31,393	31,692	263,993	153,474	305,834
	97.223	55,679	122,224	25,755	16.534	19,347	122,978	72,213	141,571
Indiana		33.008	66,508	20.835	14,058	14,585	75.672	47.066	81.093
10wa	54,837						57,821	35,789	62,284
Kansas	40,864	23,635	49,776	16,957	12,154	12,508	31,021	33,103	02,201
Kentucky	38,144	23,291	42-011	19,193	11,729	11.395	55.337	35,020	53,406
Lonisians	35,525	19.747	43,504	12,653	9.143	9,907	48.178	28,890	53,411
Lonisiana		8.473	20.043	7.683	4,773	5,646	23,373	13,246	25,689
Maine	15,690					9,138	60,446	34.863	65.717
Maryland	48,034	26,309	56,579	12,412	8,554				
Massachusetts	97,447	63,188	125,603	17,695	14,915	15,211	115,142	78,103	140,814
Michigan	246,973	141,115	258,733	33,553	24,203	22,186	280,526	165,318	280,919
Minnesota	60,567	37.325	77.038	17,108	13.453	13,103	77,675	50,778	90,141
Mississippi	26.382	13.783	26,931	15.264	12,297	10,408	41,646	26,080	37,339
Missouri	84.905	49,606	102,684	27.631	21.826	22,135	112,536	71,432	124,819
Montana		7,015	17,142	8,243	4,414	5,544	23,543	11,429	22,686
		40.000	00.450	40.000	0.000	2 254	40 720	25 000	40,206
Nebraska	28,654	16.786	32,452	12,082	8,283	7,754	40,736	25,069	
Nevada	4,597	2,105	4,398	1,373	1,136	1,130	5,970	3,241	5,528
New Hampshire	10,790	5.099	13,270	3.749	1.838	2,879	14.539	6,937	16,149
New Jersey	106,585	63,784	134,584	22,604	17,666	16,909	129,189	81,450	151,493
New Mexico	8,969	4,685	10,244	4,952	3,113	4,093	13,921	7,798	14,337
New York	308,710	183.070	331,730	56.259	43,836	36,203	364,969	226,906	367.933
North Carolina	54.75C	30.648	65,727	24,445	15.196	18.078	79,201	45,844	83,805
North Carolina	54.756				3.823	4,671	18.045	9,869	18,292
North Dakota	11,894	6.046	13,621	6,151					
Ohio	215,359	124.689	256,034	45,336	32,581	30,389	260,695	157,270	286,423
Oklahoma	39,119	24,510	46,226	18,392	13,346	13,844	57,511	37,856	60,070
Oregon	34.121	17,520	41,558	12,184	7,465	8,973	46.305	24,985	50,531
Pennsylvania	228,733	137,695	289,285	52,586	38.014	38,426	281,319	175,709	327,711
Rhode Island	18.261	10,052	22,337	3,495	2,606	3,039	21,756	12,658	25,376
South Carolina	28.705	16.635	35,611	11.194	8,405	7,978	39,899	25,040	43,589
South Carolina	20,100								15,989
South Dakota	10,808	6,281	12,451	5,549	3,456	3,538	16,357	9,737	10,363
Tennessee	59,732	30.689	56,115	23.206	15,603	13,901	82,938	46,292	70,016
rexas	139.780	88,069	174.314	55.182	41,275	44,296	194,962	129,344	218,610
t tan	12.278	6,280	13,156	4.612	2,680	3,256	16.890	8,960	16,412
Vermont	8,164	4,167	10,204	3,946	2,482	2,867	12,110	6,649	13,071
Virginia	67,435	31,573	73,808	22,555	14,224	15,938	89,990	45,797	89,746
Woodstood		DE FOR		12 700	0.149	10 672	61,491	34,713	69,285
Washington	47,711	25,565	58,613	13.780	9.148	10,672			
West Virginia	22,882	13,432	33,166	9.019	6.639	8,570	31,901	20.071	41,736
wisconsin	71.116	44.608	91,109	19,729	13.610	14.744	90,845	58,218	105,853
Wyoming	7.049	3,834	8,700	3,492	2,286	2,503	10,541	6,120	11,203
TOTAL	3.167,231	1,815,196	3,731,166	879,132	625,249	640,697	4,046,363	2,440,445	4,371,863

<sup>\*</sup> Data from R. L. Polk & Co.

IES

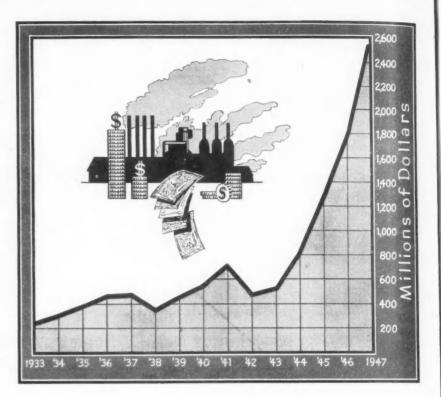
## Wholesale Value of Repair Parts and Accessories Production, 1933-1947

## Wholesale Value of Repair Parts and Accessories Production, 1933-1947

Year																	Wholesale Value
1933				,	,	,	,		*								\$234,461,000
1934		×									4			,			304,642,000
1935			*	į	į.	,									,	×	378,323,000
1936												Ì			,		448,527,000
1937																	464,619,000
1938																	348,068,000
1939																	454,673,000
1940							,										553,004,000
1941																	718,212,000
1942	*		,	,		,					,	,		,			471,957,000
1943							v										527,710,000
1944							,										816,724,000
1945																	1,284,926,000
1946																*	1,752,918,000
1947																×	2,503,220,000

<sup>\*</sup> Partly estimated.

The above data are based on Federal Excise tax collections. The excise tax does not apply on parts and accessories exported, so these values apply for domestic sales only. Prior to July 1, 1944, sales to U. S. government were not subject to the tax, but have been since that date.



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## 42% of Cars in Use are 10 or More Years Old

The data shown below are based on the tabulations "Cars in Use by Makes, by States and Year of Manufacture" published in previous Statistical Issues of Automotive Industries for the years 1938 through 1946. Basic data for 1947 will be found on pages 104 to 111 inclusive of this issue.

## Number of Passenger Cars in Use as of July of Each Year

	1938		194	1940			194	6	1947	
		% of		% of		% of		% of		% of
	Units	Total	Units	Total	Units	Total	Units	Total	Units	Total
Under 1 year of age	1,133,535	5.28	2,321,239	9.15	3,239,741	11.79	448,192	1.80	1,367,295	5.01
1- 2 years old	3,275,472	15.21	2,422,671	9.55	3,111,943	11.32	0		2,056,130	7.54
2- 3 years old	3,030,016	14.07	1,745,888	6.88	2,401,802	8.74	0		0	
3- 4 years old	2,101,774	9.76	3,498,466	13.79	1,732,560	6.30	0		0	
4- 5 years old	1,631,843	7.58	3,233,875	12.75	3,481,335	12.67	997,268	4.00	0	1.010
5- 6 years old	1,239,090	5.76	2,220,362	8.75	3,175,362	11.55	4.106,927	16.46	1,065,336	3.90
6- 7 years old	905,547	4.21	1,696,971	6.69	2.138,773	7.78	3,182,089	12.75	4,085,413	14.97
7- 8 years old	1,557,726	7.24	1,250,152	4.93	1,590,608	5.79	2,425,996	9.72	3,113,260	11.41
8- 9 years old		8.23	864,957	3.41	1,120,086	4.08	1,736,349	6.96	2,378,798	8.72
9-10 years old		10.64	1,438,197	5.67	735,440	2.68	3,390,202	13.58	1,679,027	6.15
10-11 years old	2,590,001*	12.02	1,483,787	5.85	1,211,262	4.41	2,892,560	11.59	3,303,955	12.11
11-12 years old			1,674,351	6.60	1,204,897	4.38	1,674,568	6.71	2,789,570	10.22
12-13 years old			773,170	3.05	1,278,055	4.65	1,021,374	4.09	1,592,404	5.84
13-14 years old			302,555	1.19	560,760	2.04	606,673	2.43	967,340	3.55
14-15 years old			441,333*	1.74*	501,988*	1.82*	368,544	1.48	567,768	2.08
15-16 years old							626,193	2.51	345,826	1.27
16-17 years old				* * * * *			591,940	2.37	596,039	2.18
17 and older*						****	888,843	3.55	1,377,057	5.05
Total	21,528,464	100.00	25.367.974	100.00	27,484,612	100.00	24,957,718	100.00	27,285,218	100.00
Age not known		100.00	188,489	100.00	215,399	100.00	184,910	100.00	236,177	
						-			-	
Total in use	23,538,036	****	25,556,463	11777	27,700,011		05 140 000		07 501 005	
Average age of known mode is	5.40 yrs.		5.57 yrs.		5.33 yrs.		25,142,628 8.94 yrs.		27,521,395 8.91 yrs.	

<sup>\*-</sup>Or cars in older age groups than shown above.

<sup>†-</sup>R. L. Polk & Co. and Reuben H. Donnelley Corp.

## **AUTOMOTIVE EXPORTS**

## 1947 Leading Export Markets of New Motor Vehicles

OCCUPANT.	W A	COTINECTO	~ * * * ~
NEW	PA	SSENGER	CARS

## NEW TRUCKS, BUSES AND CHASSIS

Country	Units	Value	Country	Units	Value
Canada	33.518	\$45,291,526	Argentina	40,848	\$78,460,263
Union of South Africa	28.974	30,526,756	Brazil		52,433,907
Belgium & Luxembourg		28,526,683	Mexico	23,737	35,142,812
	23,578	27,449,125	Canada	11,728	28,474,802
	18,404	26,751,810	Venezuela	14,079	24,436,578
DI COLICE	18,494	23,494,886	Belgium & Luxembourg	13.245	15,690,687
717 Canada	12,500	14,503,401	Union of So. Africa		15,072,534
Venezuela	7.690	10,156,461	Cuba		13,871,896
Netherlands	8,497	9,943,454	Sweden	E 050	10,444,095
Cuba	7,342	9,494,726	India & Dependencies		9,873,865
India & Dependencies	7,546	8,956,977	Colombia	F FO 1	9,298,295
Switzerland	6,003	7,539,620	Philippine Republic		7,271,554
Philippine Republic	5,355	7,006,648	Turkey	M	7,240,194
Colombia	4,386	5,820,651	Netherland Indies		7,080,821
Portugal	3,769	4,958,115	Australia	P P 4 P	6,896,566
Australia	4.854	4,910,577	Saudi Arabia		6,594,114
Chile	2,896	4,153,126	Chile	O	6,202,392
Egypt	2,235	3,079,505	Portugal	0.001	5,562,400
France	1,958	3,055,154	Uruguay	0.010	4,799,629
Peru	2,138	2,638,490	Belgium Congo		4,055,248
Total 2	224,367	\$278,257,691	Total	218,053	\$348,902,652
All Other Countries		57,072,835	All Other Countries	49,546	83,024,761
Total—All Countries 2	266,595	\$335,330,526	Total All Countries	267,599	\$431,927,413

## U. S. Exports of Automotive Products, 1943-1947

4		43		1944		1945		1946		Volna
Type of Product	Number	Value	Number	Value	Numbe	r Value	Numbe	r Value	Number	Value
VEHICLES										
Passenger Car and Chassis, New	2,088 749 74,847 347 859 22,278	\$2,420,506 656,264 145,772,105 351,228 607,373 11,352,099	1,649 1,428 175,080 4,046 1,560 18,016	\$2,784,433 1,505,031 399,795,242 5,529,709 2,511,161 8,253,240	1,206 1,560 142,338 5.435 3,320 6,824	\$1,447,376 1,756,678 348,327,144 7,956,699 3,293,363 3,057,813	116,994 2,482 167,980 10,203 14,138 6,114	\$122,500,568 2,671,977 225,929,505 14,334,370 8,729,268 2,413,520	266,795 10,987 267,600 7,980 19,120 10,159	\$335,330,52 16,870,00 429,998,47 17,094,70 21,394,31 3,878,42
ENGINES										
Diesel, truck and bus for assembly	100 8,190 909 516 7,694 3,783 8,418	108,753 1,651,456 237,987 272,318 1,374,666 1,270,851 49,625,882	577 9,467 333 114 4,692 3,978 11,222	990,297 1,976,235 102,109 115,379 1,091,763 1,172,179 41,624,282	370 11,118 661 285 8,262 4,427 5,235	663,015 2,721,864 80,338 412,671 1,752,013 1,072,145 7,815,295	1,740 9,074 1,402 973 13,106 6,558 7,132	1,379,333 1,968,681 174,514 904,697 3,357,715 705,575 2,812,317	817 11,181 2,094 2,112 16,552 43,639 7,100	961,75 1,921,41 285,83 2,060,13 3,348,98 4,403,25 3,888,59
Parts for Assembly	*****	54,848,146	*****	60,819,532	*****	58,187,070	*****	50,776,001	*****	84,251,94
REPLACEMENT PARTS AND ACCESSOR	ES									
fotorcycle parts and accessories.  park Plugs Parts for replacement, Other, n.e.s. Parts Lining, not and semi-molded, lbs.* Parts Blocks, molded and semi-molded, lbs.* Parts Blocks, molded and semi-molded, lbs.* Clutch Facing, moven, lbs.* Clutch Facing, woven, units* Clutch Facing, woven, units* Parting, Lighting and Ignition Equipment* Batteries, storage, 6 and 12 volt*.	4,394,388 199,186 1,542,531 353,892 203,359 6,667 881,795 400,395	52,740,719 244,734 8,928,166	361,728 14,860 978,067 434,477 581,210	4,057,354 1,557,296 146,809,283 325,559 9,148,469 1,467,692 193,443 251,543 16,839 385,367 182,286 3,693,201 4,929,007 501,821	2,185,463 353,628 285,113 7,374 881,017 479,829 720,925	142,246,018 489,724 7,448,252 1,580,652 236,099 218,374 7,715 346,104 209,891 5,261,686 6,813,114	12,921,916 426,588 2,495,990 740,670 411,932 28,146 939,834 256,407 407,425 1,626,369	83,637,347 879,831 10,799,445 1,837,752 368,680 297,784 23,603 375,601 124,445 6,462,501 2,949,777	3,308,517 949,453 570,080 54,386 1,281,363 355,037	994,02 3,971,58 164,156,41 24,323,31 2,907,77 552,24 448,21 45,91 597,66 197,00 13,305,48 6,631,11 2,706,06
GARAGE EQUIPMENT										
Auto Tire Service Equipment and Parts Pumps for Gasoline and Oil Service Appliances and Parts, Other	2,720	941,001 464,049 2,166,726	5,514	808,629 247,195 2,223,347	6,186	1,059,965 207,112 3,778,897	19,533	1,595,304 1,231,393 9,028,669	31,905	1,933,5: 3,939,6: 19,757,6
TIRES AND TUBES										
Casings, Truck and Bus Casings, Other Automobiles Unner Tubes for Cars, Trucks and Buses Lires, Solid for Cars and Trucks. Lire Sundries and Repair Material, Camelback, lbs Other Tire Sundries and Repair Materials	273,382 2,542,278 5,820 911,982	3,421,714 6,641,150 224,002 231,948	1,724,906 189,521 1,957,073 4,221 730,904 2,650,921	2,175,434 5,189,391 168,180 184,925	1,450,189 142,908 1,317,815 15,246 1,795,595 2,633,709	1,826,638 4,200,261 550,857 453,777	1,406,289 1,059,126 1,873,214 42,678 6,733,524 5,922,499	13,549,726 7,429,495 1,284,752 1,768,631	1,930,331 2,095,679 2,978,396 271,490 6,888,664 5,423,489	76,190,04 27,732,23 10,440,83 6,717,91 1,692,23 2,629,83
Total-All Products	-	2422 454 750		8764,964,828		8668,186,962		8642,344,091		81,299,680,5

## U. S. Exports of New Motor Vehicles, 1916-1947

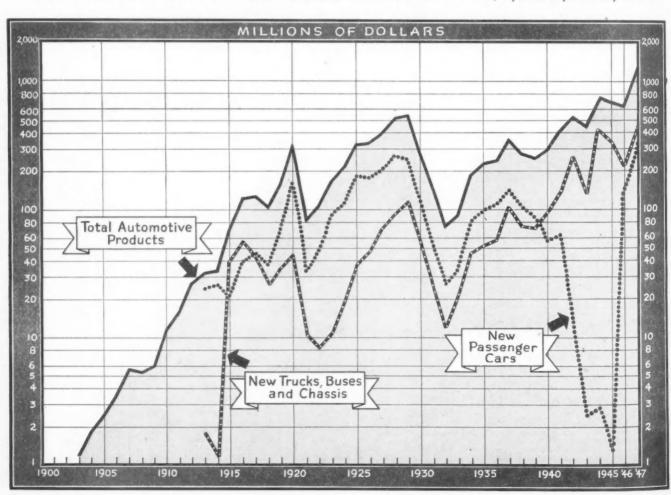
In Units and Their Value and Including Lend-Lease

YEAR   Number   Value   Valu		PA	SSENGER CA	% of U.S.	TRUCKS,	BUSES AND C	% of U.S.	TOTA	L MOTOR VI	EHICLES % of U.S.
1917. 64.808 48.612.632 3.7 15.977 42.343.502 12.5 80.785 99.956.134 4.3 1918 36.936 36.278.292 3.9 10.308 6.814.952 4.5 47.244 63.093.244 4.3 1919 67.145 73.700.527 4.1 15.585 35.425.437 6.9 82.730 109.125.964 4.0 1919 67.145 73.700.527 4.1 15.585 35.425.437 6.9 12.730 109.125.964 4.0 1919 72.0 142.508 165.255.921 7.5 29.136 40.757.81 9.1 171.644 212.031.702 4.4 1919 72.0 142.508 165.255.921 7.5 29.136 10.335.893 5.3 38.790 42.899.638 7.7 1921 72.2 1922 1922 1923 1924 1925 1926 1926 1926 1926 1926 1926 1927 1927 1927 1927 1927 1928 1929 1929 1929 1929 1929 1929 1929	YEAR	Number	Value	Production (Units)	Number	Value	Production (Units)	Number	Value	Production
1917 64,808 48,612,632 3.7 15,977 42,343,502 12.5 80,785 90,586,134 4.2 1918 36,936 36,278,292 3.9 10,308 62,814,952 4.5 47,244 63,093,244 4.0 1919 67,145 73,700,527 4.1 15,535 35,425,437 6.9 82,730 109,125,964 4.4 1919 67,145 73,700,527 4.1 15,535 35,425,437 6.9 127,1644 212,031,702 7.7 1921 30,950 32,533,725 2.1 7,840 10,335,893 5.3 38,790 42,899,618 2.4 1922 66,791 51,049,816 2.9 11,443 10,335,893 5.3 38,790 42,899,618 2.4 1923 127,035 90,692,272 3.5 24,899 15,317,136 6.1 151,894 100,009,408 1.7 1924 151,380 112,534,729 4.7 27,352 19,199,344 6.6 178,732 131,734,013 4.9 1925 244,306 134,835,830 6.5 58,625 37,703,402 11.0 302,931 222,589,232 7.1 1926 224,306 134,835,830 6.5 68,625 37,703,402 11.0 302,931 222,589,232 7.1 1926 228,540 176,432,157 6.3 66,807 47,176,107 21.1 305,420 223,608,264 7.1 1927 278,748 226,933,369 9.8 140,191 93,006,070 25.8 515,519 362,399,439 11.8 1928 346,530 233,344,000 7.5 197,872 112,607,885 2.6 544,502 335,941,955 10.1 1930 159,464 110,355,978 5.7 85,666 56,851,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,82,82,82 25,502,047 3.8 49,415 265,210,975 11.8 15,852 79,005,560 5.6 192,217,997 7.3 1931 86,437 52,82,82,82 4.3 49,415 265,210,975 11.8 15,852 79,005,560 5.6 1932 44,826 225,502,047 3.8 49,415 265,210,975 11.8 15,852 79,002,560 5.6 1932 44,826 225,502,047 3.8 25,532 12,442,881 10.8 69,814 37,644,728 5.1 1930 159,464 110,355,978 5.7 85,666 56,851,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,831,845 4.2 44,103 20,831,838 12.7 11.4 14,488 56,656,802 5.8 1938 11.8 15,852 79,000,666 5.8 35,666 56,851,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,831,845 4.2 44,103 20,831,838 12.7 11.4 11,488 56,656,802 5.8 1938 11.8 15,852 79,002,560 5.6 1938 11.8 15,852 79,002,560 5.6 1938 11.8 15,852 79,002,560 5.6 1938 11.8 15,852 79,002,560 5.6 1938 11.8 15,852 79,002,560 5.6 1938 11.8 15,833,349 167,233 104,532 104,532 104,533 79,000,668 51,425,559 16.3 242,155 125,729,922 8.7 1935 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119,440 119	1916	56,234	\$40,660,263						\$97,465,811	4.2
1918	1917	64,808	48,612,632	3.7	15,977	42,343,502	12.5	80,785	90,956,134	
1919		36,936	36,278,292	3.9	10,308	26,814,952	4.5	47,244		
1920. 142,508 165,255,921 7.5 29,136 46,775,781 9.1 171,644 212,031,702 171,111,111,111,111,111,111,111,111,111			73,700,527	4.1	15.585	35,425,437	6.9	82,730		
1921. 80,950 32,533,725 2.1 7,840 10,335,893 5.3 38,790 42,869,618 2.4 1922 665,791 51,049,816 2.9 11,443 8,270,708 4.2 78,234 59,320,524 2.4 1933 127,035 90,692,772 3.5 24,859 15,317,136 6.1 151,894 106,009,408 3.7 1924 151,330 112,534,729 4.7 27,352 19,199,344 6.6 178,732 131,734,073 4.9 1925 244,306 184,485,680 6.5 58,625 37,703,402 11.0 302,931 222,589,232 7.1 1926 238,540 176,432,157 6.3 66,880 47,176,107 21.1 305,420 222,589,252 7.1 1927 278,748 207,966,456 9.5 105,477 70,123,600 22.7 384,195 278,009,656 11.2 1927 278,748 207,966,456 9.5 105,479 1930,000,070 25.8 515,619 362,399,439 11.8 1928 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 35,941,985 10.1 1930 159,464 110,555,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,855 4.3 49,415 26,210,975 11.8 135,852 79,662,560 5.6 1932 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1932 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 184,387 80,604,663 6.8 93,766 45,125,339 11.4 1935 127,729,922 8.7 1933 148,387 80,604,663 6.8 93,766 45,125,339 11.4 184,387 80,604,663 6.8 93,766 45,125,339 18.9 406,795 245,532 12,122,681 1933 143,399 87,171,300 5.0 169,076 102,889,939 18.9 406,795 245,532,142 8.4 1933 143,909 87,171,300 5.0 169,076 102,889,939 18.9 406,795 245,532,142 8.4 1933 143,909 87,171,300 5.0 169,076 102,889,939 18.9 406,795 245,532,142 8.4 1939 144,599 87,171,300 5.0 169,076 102,889,939 18.9 406,795 245,532,142 8.4 1939 114,144 114,1						46,775,781	9.1			
1922. 66,791 51,049,816 2.9 11,443 8.270,708 4.2 78,234 59,320,524 3.4 1923 127,035 90,692,272 3.5 24,859 15,317,136 6.1 151,894 106,009,408 3.7 1924 151,380 112,534,729 4.7 27,352 19,199,344 6.6 178,732 131,734,073 4.9 1925 244,306 184,825,830 6.5 58,825 37,703,402 11.0 302,931 222,559,232 7.1 1926 238,540 176,432,157 6.3 66,880 47,176,107 21.1 305,420 223,608,264 7.1 1927 278,748 207,966,456 9.5 105,447 70,123,600 22.7 384,195 278,090,056 11.2 1928† 375,628 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8 1929 346,630 239,340,00 7.5 197,872 112,607,985 25.6 544,502 351,941,985 10.1 1930 159,464 101,355,978 5.7 85,666 58,861,129 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,555 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1933 67,357 44,282 25,502,047 3.8 25,552 12,142,681 10.8 69,814 37,644,728 5.1 1933 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,836,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 1938 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1933 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1933 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 169,076 102,889,393 18.9 406,795 243,528,142 8.4 1944 18,49,880 13.9 228,878 208,852,528 5.0 1944 184 184,19,880 13.9 228,878 208,852,528 5.0 1944 144,144 114,144 114,144 114,144 114,1										
1923. 127,035 90,692,272 3.5 24,859 15,317,136 6.1 151,894 106,009,408 3.7 1924 151,380 112,534,729 4.7 27,352 19,199,344 6.6 178,732 131,734,073 4.9 1925 244,306 184,855,830 6.5 58,625 37,703,402 11.0 302,931 222,589,232 7.1 1926 238,540 176,432,157 6.3 66,880 47,176,107 21.1 305,420 223,608,264 7.1 1927 278,748 207,966,456 9.5 105,447 70,123,600 22.7 384,195 278,090,056 11.2 1928 375,428 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8 1928 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 351,941,955 10.1 1930 159,464 110,355,978 5.7 85,666 58,61,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,585 4.3 49,415 26,210,975 11.8 153,852 79,062,560 5.6 1933 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 34,636,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 3.7 1935 179,470 99,342,411 5.5 100,668 51,959,593 14.4 280,138 151,383,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 237,171,947 99,342,411 5.5 100,668 51,959,593 14.9 406,795 243,528,142 8.4 1939 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1944 183,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 11,446 60,702,648 2.4 147,132 148,149,880 13.9 406,795 243,528,142 8.4 1939 144,309 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 1944 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 184,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 188,593,315 7.2 1944 184 184,909 87,171,300 5.0 116,913 71,										
1924										
1925.         244,306         184,885,830         6.5         58,625         37,703,402         11.0         302,931         222,589,232         7.1           1926.         238,540         176,432,157         6.3         66,880         47,176,107         21.1         305,420         223,608,264         7.1           1927.         278,748         207,966,456         9.5         105,447         70,123,600         22.7         384,195         278,090,056         11.2           1928.         375,422         269,393,369         9.8         140,191         93,006,070         25.8         515,619         362,399,439         11.8           1929.         346,630         239,334,000         7.5         197.872         112,607,985         25.6         544,502         351,941,985         10.1           1930.         159,464         110,355,978         5.7         85,666         56,861,119         14.9         245,130         167,217,097         7.3           1931.         86,437         52,851,585         4.3         49,415         26,210,975         11.8         135,852         79,062,560         56           1932.         44,282         25,502,047         3.8         25,532         12,142,661         10.8										
1926. 238,540 176,432,157 6.3 66,880 47,176,107 21.1 305,420 223,608,264 7.1  1927. 278,748 207,966,456 9.5 105,447 70,123,600 22.7 384,195 278,090,056 11.2  1928. 375,428 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8  1929. 346,630 229,334,000 7.5 197,872 112,607,985 25.6 544,502 361,941,985 10.1  1930. 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3  1931. 86,647 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6  1932. 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1  1933. 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,658,802 5.8  1934. 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7  1935. 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0  1936. 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6  1937. 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4  1938. 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,68 11.4  1939. 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2  1941. 81,746 60,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0  1942. 13,951 13,199,744 \$15,634 258,241,298 19.1 170,295 271,441,042 1943 12,905 114,477,520 19.8  1946. 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2										
1927. 278,748 207,966,456 9.5 105,447 70,123,600 22.7 384,195 278,090,056 11.2 1928† 375,428 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8 1929 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 351,941,985 10.1 1930 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1932 44,282 25,502,947 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1932 44,282 25,502,947 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 61,338 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 237,719 140,638,203 6.0 169,076 102,889,399 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941 28,136 12,136 60,702,648 2.4 147,132 148,149,880 13.9 122,878 208,852,528 5.0 1944 15,126 11,249 12,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2										
1928† 375,428 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8 1929 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 351,941,985 10.1 1930 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1932 44,222 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,636,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941 81,361 82,436 66,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0 1942 13,951 13,197,744 \$16,634 24,433 \$175,080 39,795,242 23.8 176,729 402,579,675 1944 1,669 2,784,433 \$175,080 39,795,242 23.8 176,729 402,579,675 1946 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	A769	230,020	210,200,201	0.3	00,000	21,210,201	44.4	300,220	200,000,002	7.1
1928† 375,428 269,393,369 9.8 140,191 93,006,070 25.8 515,619 362,399,439 11.8 1929 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 351,941,985 10.1 1930 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931 86,437 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1932 44,222 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,636,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941 81,361 82,436 66,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0 1942 13,951 13,197,744 \$16,634 24,433 \$175,080 39,795,242 23.8 176,729 402,579,675 1944 1,669 2,784,433 \$175,080 39,795,242 23.8 176,729 402,579,675 1946 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	1927	278,748	207,966,456	9.5	105,447	70,123,600	22.7	384,195	278,090,056	11.5
1929. 346,630 239,334,000 7.5 197,872 112,607,985 25.6 544,502 351,941,985 10.1 1930. 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931. 86,437 52,851,585 4.3 49,415 26,210,975 11.8 155,852 79,062,560 5.6 1932. 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933. 67,355 32,945,464 4.2 4.103 20,691,338 12.7 111,458 54,658,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 12,323 12,323 12,323,339 12,338 167,633 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941 81,766 66,702,648 2.4 147,132 148,149,880 13.9 122,878 208,852,528 5.0 1942 13,951 13,199,744 \$156,344 258,241,298 19.1 170,295 271,441,042 1943 2,088 2,420,506 \$7,847 145,772,105 10.7 76,935 148,192,611 1944 1,669 2,784,433 \$175,080 399,795,242 23.8 176,729 402,579,675 1946 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	40001									
1930. 159,464 110,355,978 5.7 85,666 56,861,119 14.9 245,130 167,217,097 7.3 1931. 86,437 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1932. 44,222 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1932. 442,22 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933. 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,636,802 5.8 1934. 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935. 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936. 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937. 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938. 167,693 104,628,982 8.4 117,943 74,451,966 24.1 285,636 179,080,968 11.4 1939. 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940. 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941. 81,746 60,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0 1942. 13,551 13,197,144 \$156,344 258,241,298 19.1 170,295 271,441,042 1943. 2,088 2,420,506 \$7,4847 145,772,105 10.7 76,935 148,192,611 1944. 1,669 2,784,433 \$7,780 12,388 349,375,242 23.8 176,729 402,579,675 1945 116,994 122,500,568 5.4 167,980 225,929,505 17.8 244,974 348,430,073 9.2	MANAGES									
1931. 86,437 52,851,585 4.3 49,415 26,210,975 11.8 135,852 79,062,560 5.6 1932. 44,282 25,502,947 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933. 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,656,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936. 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937. 237,719 140,638,203 6.0 169,076 102,889,399 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939. 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940. 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941. 81,766 66,702,648 2.4 147,132 148,149,880 13.9 12,28,878 208,852,528 5.0 1942. 13,951 13,199,744 \$15,6344 258,241,298 19.1 170,295 271,441,042 1943. 2,088 2,420,506 \$74,847 145,772,105 10.7 76,935 148,192,611 1944 1,699 2,784,433 \$175,080 399,795,242 23.8 176,729 402,579,675 1946. 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2										
1932. 44,282 25,502,047 3.8 25,532 12,142,681 10.8 69,814 37,644,728 5.1 1933 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,636,802 5.8 1934 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,533,315 7.2 1940 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941 81,766 66,702,648 2.4 147,132 148,149,880 13.9 122,878 208,852,528 5.0 1942 13,951 13,199,744 \$15,6344 1258,241,298 19.1 170,295 271,441,042 1943 2,088 2,420,506 \$7,887 145,772,105 10.7 76,935 148,192,611 1944 1,669 2,784,4376 1.7 142,338 348,327,144 21.7 135,544 349,774,520 19.8 1946 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	1021									
1933. 67,355 33,945,464 4.2 44,103 20,691,338 12.7 111,458 54,636,802 5.8 1934. 148,387 80,604,563 6.8 93,766 45,125,359 16.3 242,153 125,729,922 8.7 1935. 179,470 99,342,411 5.5 100,668 51,995,938 14.4 280,138 151,338,349 7.0 1936. 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937. 237,719 140,638,203 6.0 169,076 102,889,939 18.9 406,795 243,528,142 8.4 1938. 167,693 104,628,982 8.4 117,943 74,451,966 24.1 285,536 179,080,968 11.4 1939. 143,909 87,171,300 5.0 116,913 71,422,015 16.4 260,822 158,593,315 7.2 1940. 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941. 81,746 60,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0 1942. 13,951 13,199,744 \$156,344 258,241,298 19.1 170,295 271,441,042 1943. 2,088 2,420,506 \$74,847 145,772,105 10.7 76,935 148,192,611 1944. 1,669 2,784,433 \$77,080 225,929,505 17.8 284,974 348,430,073 9.2 1946. 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	1022									
1934     148,387     80,604,563     6.8     93,766     45,125,359     16.3     242,153     125,729,922     8.7       1935     179,470     99,342,411     5.5     100,668     51,995,938     14.4     280,138     151,338,349     7.0       1936     186,542     107,483,285     5.1     108,167     56,765,713     13.7     294,709     164,248,998     6.6       1937     237,719     140,638,203     6.0     169,076     102,889,939     18.9     406,795     243,528,142     8.4       1938     167,693     104,628,982     8.4     117,943     74,451,986     24.1     255,636     179,080,968     11.4       1939     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941     81,766     66,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942     13,951     13,199,744     \$	4699									
1935.     179,470     99,342,411     5.5     100,668     51,995,938     14.4     280,138     151,338,349     7.0       1936.     186,542     107,483,285     5.1     108,167     56,765,713     13.7     294,709     164,248,998     6.6       1937.     237,719     140,638,203     6.0     169,076     102,889,939     18.9     406,795     243,528,142     8.4       1938.     167,693     104,628,982     8.4     117,943     74,451,986     24.1     285,636     179,080,968     11.4       1939.     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940.     88,866     57,255,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,766     60,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,199,744     ‡     156,344     258,241,298     19.1     170,295     271,441,042       1943.     2,088     2,420,506     ‡     74,847     145,772,105     10.7     76,935     148,192,611       1944.     1,649     2,784,433     ‡	4004									
1936. 186,542 107,483,285 5.1 108,167 56,765,713 13.7 294,709 164,248,998 6.6 1937. 237,719 140,638,203 6.0 169,076 102,889,339 18.9 406,795 243,528,142 8.4 1938 167,693 104,628,982 8.4 117,943 74,451,986 24.1 285,636 179,080,968 11.4 1939 87,171,300 5.0 16,913 71,422,015 16.4 260,822 158,593,315 7.2 1940. 88,806 57,253,737 2.6 103,459 87,867,077 13.7 192,265 145,120,814 4.5 1941. 81,746 60,702,648 2.4 147,132 148,149,880 13.9 228,878 208,852,528 5.0 1942. 13,951 13,199,744 \$ 156,344 258,241,298 19.1 170,295 271,441,042 1943. 2,088 2,420,506 \$ 74,847 145,772,105 10.7 76,935 148,192,611 1944. 1,649 2,784,433 \$ 175,080 399,795,242 23.8 176,729 402,579,675 1945 1,206 1,447,376 1.7 142,338 348,327,144 21.7 143,544 349,774,520 19.8 1946. 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2										
1937.     237,719     140,638,203     6.0     169,076     102,889,939     18.9     406,795     243,528,142     8.4       1938.     167,693     104,628,982     8.4     117,943     74,451,986     24.1     285,636     179,080,968     11.4       1939.     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940.     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,746     60,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,193,744     \$	1935	119,410	99,392,911	9.9	100,666	31,993,938	12.4	280,138	151,338,349	7.0
1937.     237,719     140,638,203     6.0     169,076     102,889,939     18.9     406,795     243,528,142     8.4       1938.     167,693     104,628,982     8.4     117,943     74,451,986     24.1     285,636     179,080,968     11.4       1939.     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940.     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,746     60,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,193,744     \$	1936	186,542	107,483,285	5.1	108,167	56,765,713	13.7	294,709	164.248.998	6.6
1938.     167,693     104,628,982     8.4     117,943     74,451,986     24.1     285,636     179,080,988     11.4       1939.     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940.     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,766     66,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,199,744     ‡     ‡     56,344     258,241,298     19.1     170,295     271,441,042       1943.     2,088     2,420,506     ‡     74,847     145,772,105     10.7     76,935     148,192,611       1944.     1,649     2,784,433     ‡     175,080     399,795,242     23.8     176,729     402,579,675       1945.     1,206     1,447,376     1.7     142,338     348,327,144     21.7     143,544     349,474,520     19.8       1946.     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9.2	1937.									
1939.     143,909     87,171,300     5.0     116,913     71,422,015     16.4     260,822     158,593,315     7.2       1940.     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,746     66,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,199,744     ‡     156,344     258,241,298     19.1     170,295     271,441,042       1943.     2,088     2,420,506     ‡     74,847     145,772,105     10.7     76,935     148,192,611       1944.     1,649     2,784,433     ‡     175,080     399,795,242     23.8     176,729     402,579,675       1945.     1,206     1,447,376     1.7     142,338     348,327,144     21.7     143,544     349,774,520     19,8       1946.     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9,2	1938									
1940.     88,806     57,253,737     2.6     103,459     87,867,077     13.7     192,265     145,120,814     4.5       1941.     81,746     60,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,199,744     \$ 156,344     258,241,298     19.1     170,295     271,441,042       1943.     2,088     2,420,506     \$ 74,847     145,772,105     10.7     76,935     148,192,611       1944.     1,649     2,784,433     \$ 175,080     399,795,242     23.8     176,729     402,579,675       1945.     1,206     1,447,376     1.7     142,338     348,227,144     21.7     143,544     349,774,520     19,8       1946.     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9,2	1939									
1941.     81,746     60,702,648     2.4     147,132     148,149,880     13.9     228,878     208,852,528     5.0       1942.     13,951     13,199,744     \$ 156,344     258,241,298     19.1     170,295     271,441,042       1943.     2,088     2,420,506     \$ 74,847     145,772,105     10.7     76,935     148,192,611       1944.     1,649     2,784,833     \$ 175,080     399,795,242     23.8     176,729     402,579,675       1945.     1,206     1,447,376     1.7     142,338     348,327,144     21.7     143,544     349,774,520     19,8       1946.     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9,2										
1942     13,951     13,199,744     ‡     156,344     258,241,298     19.1     170,295     271,441,042       1943     2,088     2,420,506     ‡     74,847     145,772,105     10.7     76,935     148,192,611       1944     1,649     2,784,433     ‡     175,080     399,795,242     23.8     176,729     402,579,675       1945     1,206     1,447,376     1.7     142,338     348,327,144     21.7     143,544     349,774,520     19,8       1946     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9,2										
1943     2,088     2,420,506     \$ 74,847     145,772,105     10.7     76,935     148,192,611       1944     1,649     2,784,433     \$ 175,080     399,795,242     23.8     176,729     402,579,675       1945     1,206     1,447,376     1.7     142,338     348,327,144     21.7     143,544     349,774,520     19,8       1946     116,994     122,500,568     5.4     167,980     225,929,505     17.8     284,974     348,430,073     9,2	1949			4.2						5.0
1944	1042			4						***
1945	1044			4						511
1946 116,994 122,500,568 5.4 167,980 225,929,505 17.8 284,974 348,430,073 9.2	1045			4.7						
	A320	1,200	1,441,576	2.4	192,338	398,327,144	21.7	143,544	349,774,520	19.8
	1946	116,994	122,500,568	5.4	167,980	225,929,505	17.8	284.974	348,430,073	9.2

‡-Taken from stockpiles. †-From 1928 through 1941 exports include shipments to non-contiguous territories.

Note-Prior to 1931 figures include used vehicles, but the effect of these used vehicles on per cent of production is negligible. Source-Machinery and Motive Products Branch, Office of International Trade, Department of Commerce.

## 1947 AUTOMOTIVE EXPORTS VALUED AT \$1,300,000,000



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## 1947 U. S. Exports of New Motor Vehicles

## By Continental Divisions

		-New Pa	ssenger Cars		N	ew Trucks,	Buses and	Chassis
Continent	Units	% of Total	Value	% of Total	Units	% of Total	Value	% of Total
North America	67,566	25.34	\$89,026,354	26.55	53,986	20.17	\$92,126,006	21.33
South America	62,103	23.30	80,983,728	24.15	106,977	39.98	185,071,678	42.85
Europe	00 000	24.78	80,447,455	23.99	39,226	14.66	58,147,465	13.46
Africa	05050	14.01	42,203,775	12.59	25,786	9.64	36,168,754	8.37
Asia	0= 000	10.44	36,723,605	10.95	35,308	13.19	52,291,170	12.11
Oceania	w ann	2.13	5,945,609	1.77	6,316	2.36	8,122,340	
Total	266.595	100.00	\$335,330,526	100.00	267,599	100.00	\$431,927,413	100.00

## 1947 U. S. Exports of New Trucks, Buses and Chassis\*

## By Tohnage Rating and Continental Divisions

E	urope	North	America										otal
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
3,518	\$3,593,660	6,716	\$7,093,588	10,430	\$12,335,562	3,527	\$4,197,183	130	<b>\$142,291</b>	2,682	\$2,988,827	27,003	\$30,351,111
2,807	2,794,744	3,025	2,806,420	3,784	3,491,710	2,279	2,144,302	1,389	1,096,138	3,015	2,879,854	16,299	15,213,168
785	1,101,299	3,124	3,097,848	4,459	4,657,019	541 802	677,099 1,010,534	266 416	197,876 372,439	532 830	569,282 934,860	9,707	10,300,423 9,862,554
	23,302,238	19,566	25,634,594	22,845	30,610,309	21,776	26,673,995	1,895		12,919	15,102,831	99,282	123,451,351
7,101	12,498,250	13,752	21,891,345	50,836	75,434,761	3,224	5,743,264	1,553	2,730,502	4,201	6,283,702	80,667	124,581,824
114 954	558,928 2,831,845	380 2,262	1,744,709 6,617,114	733 5,168	7,585,702 15,206,139	20 1,355	67,367 4,040,029	558	1,050,420	21 900	77,591 4,327,750	1,268 11,197	10,034,297 34,073,297
	217,065 738,770	106 672	522,240 3,014,531	121 2,016	600,155 8,920,444	5 271	26,679 1,274,371	1 13	3,174 34,687	24 184	56,651 667,822	299 3,363	1,425,964 14,650,625
249	4,320,828 2,121,965	440 1,269	5,318,934 10,134,274			44 374	595,105 4,318,476 1,522,766	39	262,930	58 262 158	650,606 1,379,708 249,270	1,860 4,408 4,238	18,268,543 32,081,504 7,632,752
39,226	\$58,147,465	53,986	\$92,126,006	106,977	\$185,071,678	35,308	<b>\$52,291,170</b>	6,316	8,122,340	_		267,599	\$431,927,413
	No. 3,518 2,807 785 2,149 20,281 7,101 114 954 42 207 327 249 692	3,518 \$3,593,660 2,807 2,794,744 785 1,101,299 2,149 2,525,452 20,281 23,302,238 7,101 12,498,250 114 558,928 954 2,831,845 42 217,065 207 738,770 327 4,320,828 249 2,121,965 692 1,542,421 39,226 \$58,147,465	No. Value No.  3,518 \$3,593,660 6,716  2,807 2,794,744 3,025  785 1,101,299 3,124  2,149 2,525,452 1,852  20,281 23,302,238 19,566  7,101 12,498,250 13,752  114 558,928 380 954 2,831,845 2,262  42 217,065 106 207 738,770 672 327 4,320,828 440 249 2,121,965 1,269 692 1,542,421 822  39,226 \$58,147,465 53,986	No.         Value         No.         Value           3,518         \$3,593,660         6,716         \$7,093,588           2,807         2,794,744         3,025         2,806,420           785         1,101,299         3,124         3,097,848           2,149         2,525,452         1,852         2,704,950           20,281         23,302,238         19,566         25,634,594           7,101         12,498,250         13,752         21,891,345           114         558,928         380         1,744,709           954         2,831,845         2,262         6,617,114           42         217,065         106         522,240           207         738,770         672         3,014,531           327         4,320,828         440         5,318,934           249         2,121,965         1,269         10,134,274           692         1,542,421         822         1,545,459           39,226         \$58,147,465         53,986         \$92,126,006	No.         Value         No.         Value         No.           3,518         \$3,593,660         6,716         \$7,093,588         10,430           2,807         2,794,744         3,025         2,806,420         3,784           785         1,101,299         3,124         3,097,848         4,459           2,149         2,525,452         1,852         2,704,950         1,959           20,281         23,302,238         19,566         25,634,594         22,845           7,101         12,498,250         13,752         21,891,345         50,836           114         558,928         380         1,744,709         733           954         2,831,845         2,262         6,617,114         5,168           42         217,065         106         522,240         121           207         738,770         672         3,014,531         2,016           327         4,320,828         440         5,318,934         991           249         2,121,965         1,269         10,134,274         2,215           692         1,542,421         822         1,545,459         1,420           39,226         \$58,147,465         53,986	No.         Value         No.         Value         No.         Value           3,518         \$3,593,660         6,716         \$7,093,588         10,430         \$12,335,562           2,807         2,794,744         3,025         2,806,420         3,784         3,491,710           785         1,101,299         3,124         3,097,848         4,459         4,657,019           2,149         2,525,452         1,852         2,704,950         1,959         2,314,319           20,281         23,302,238         19,566         25,634,594         22,845         30,610,309           7,101         12,498,250         13,752         21,891,345         50,836         75,434,761           114         558,928         380         1,744,709         733         7,585,702           954         2,831,845         2,262         6,617,114         5,168         15,206,139           42         217,065         106         522,240         121         600,155           207         738,770         672         3,014,531         2,016         8,920,444           327         4,320,828         440         5,318,934         991         7,383,070           249         2,121,965 <td>No.         Value         No.         Value         No.         Value         No.         Value         No.           3,518         \$3,593,660         6,716         \$7,093,588         10,430         \$12,335,562         3,527           2,807         2,794,744         3,025         2,806,420         3,784         3,491,710         2,279           785         1,101,299         3,124         3,097,848         4,459         4,657,019         541           2,149         2,525,452         1,852         2,704,950         1,959         2,314,319         802           20,281         23,302,238         19,566         25,634,594         22,845         30,610,309         21,776           7,101         12,498,250         13,752         21,891,345         50,836         75,434,761         3,224           114         558,928         380         1,744,709         733         7,585,702         20           954         2,831,845         2,262         6,617,114         5,168         15,206,139         1,355           42         217,065         106         522,240         121         600,155         5           207         738,770         672         3,014,531         2,0</td> <td>No.         Value         No.         Value         No.         Value         No.         Value         No.         Value           3,518         \$3,593,660         6,716         \$7,093,588         10,430         \$12,335,562         3,527         \$4,197,183           2,807         2,794,744         3,025         2,806,420         3,784         3,491,710         2,279         2,144,302           785         1,101,299         3,124         3,097,848         4,459         4,657,019         541         677,099           2,149         2,525,452         1,852         2,704,950         1,959         2,314,319         802         1,010,534           20,281         23,302,238         19,566         25,634,594         22,845         30,610,309         21,776         26,673,995           7,101         12,498,250         13,752         21,891,345         50,836         75,434,761         3,224         5,743,264           114         558,928         380         1,744,709         733         7,585,702         20         67,367           954         2,831,845         2,262         6,617,114         5,168         15,206,139         1,355         4,040,029           42         217,065</td> <td>No.         Value         No.         Value         <th< td=""><td>No.         Value         No.         Value         8.122.340         \$2.282         Xalue         Xalu</td><td>No.         Value         No.         Value         <th< td=""><td>No.         Value         No.         Value         App.         252,254         No.         Value         No.         Value</td><td>No.         Value         No.         Value         <th< td=""></th<></td></th<></td></th<></td>	No.         Value         No.         Value         No.         Value         No.         Value         No.           3,518         \$3,593,660         6,716         \$7,093,588         10,430         \$12,335,562         3,527           2,807         2,794,744         3,025         2,806,420         3,784         3,491,710         2,279           785         1,101,299         3,124         3,097,848         4,459         4,657,019         541           2,149         2,525,452         1,852         2,704,950         1,959         2,314,319         802           20,281         23,302,238         19,566         25,634,594         22,845         30,610,309         21,776           7,101         12,498,250         13,752         21,891,345         50,836         75,434,761         3,224           114         558,928         380         1,744,709         733         7,585,702         20           954         2,831,845         2,262         6,617,114         5,168         15,206,139         1,355           42         217,065         106         522,240         121         600,155         5           207         738,770         672         3,014,531         2,0	No.         Value         No.         Value         No.         Value         No.         Value         No.         Value           3,518         \$3,593,660         6,716         \$7,093,588         10,430         \$12,335,562         3,527         \$4,197,183           2,807         2,794,744         3,025         2,806,420         3,784         3,491,710         2,279         2,144,302           785         1,101,299         3,124         3,097,848         4,459         4,657,019         541         677,099           2,149         2,525,452         1,852         2,704,950         1,959         2,314,319         802         1,010,534           20,281         23,302,238         19,566         25,634,594         22,845         30,610,309         21,776         26,673,995           7,101         12,498,250         13,752         21,891,345         50,836         75,434,761         3,224         5,743,264           114         558,928         380         1,744,709         733         7,585,702         20         67,367           954         2,831,845         2,262         6,617,114         5,168         15,206,139         1,355         4,040,029           42         217,065	No.         Value         No.         Value <th< td=""><td>No.         Value         No.         Value         8.122.340         \$2.282         Xalue         Xalu</td><td>No.         Value         No.         Value         <th< td=""><td>No.         Value         No.         Value         App.         252,254         No.         Value         No.         Value</td><td>No.         Value         No.         Value         <th< td=""></th<></td></th<></td></th<>	No.         Value         8.122.340         \$2.282         Xalue         Xalu	No.         Value         No.         Value <th< td=""><td>No.         Value         No.         Value         App.         252,254         No.         Value         No.         Value</td><td>No.         Value         No.         Value         <th< td=""></th<></td></th<>	No.         Value         App.         252,254         No.         Value         No.         Value	No.         Value         No.         Value <th< td=""></th<>

## New Car and Truck Registration by Months\*

			Passenger Ca	ars				
Month	1947	1946	1941	1940	1939	1938	1937	1936
January	209,063	(	297,558	260,216	203,212	145,765	280,685	215,775
February	214.333	1	299,701	224,625	164,942	120,359	215,049	176,651
March	264,714	493,299	419,396	312,371	248,038	181,222	363,738	301,239
April	290,226	1	488,460	353,239	268,335	192,241	384,951	397,186
May	286,719	1	514,478	345.748	280,834	178,052	391,697	392,744
June	269,863	1	443,470	318,615	243,741	156,384	360,236	369,422
July	263,167	172,961	391,795	315,246	229,308	148,896	365,767	357,490
August	264,866	199,316	246,595	211,031	182,633	127,954	306,958	262,912
September	251,655	219,281	125,293	148,000	141,633	93,269	235,683	208,896
October	281,428	225,180	165,485	290,495	212,586	119,053	202,898	171.397
November	258,934	230,424	164.747	301,430	231,571	200.853	196,469	223,732
December	312,263	274,735	174,188	334,889	246,544	226,973	179,621	327,053
Total	3,167,231	1,815,196	3,731,166	3,415,905	2,653,377	1,891,021	3,483,752	3,404,497
		Comm	nercial Cars a	nd Trucks				
	1947	1946	1941	1940	1939	1938	1937	1936
January	62,477	1	50.830	45.026	37,715	31,995	47,618	43.760
February	63,752	87,375	50,124	40,729	34,102	27,551	41,843	40,301
March	79,344	.,	62,413	52,290	45,083	37,255	60,301	52,428
April	85,148	40.920	64,236	54.846	46,063	35,682	67,832	64,956
May	76,901	56,285	64,177	50.543	45,381	32,937	65.857	62,183
June	65,458	46,488	62,265	42,533	40,482	30,647	58,626	56,851
July.	71,647	53,657	67,412	49,053	44,747	33,475	61,686	63,695
August	75,912	62,820	56,191	47,472	43.523	34.231	60.872	59,222
September	69.899	69.565	43,892	37,143	32,983	26,570	54,711	54,611
October	87,167	74,708	41,352	47,909	37.923	19,589	40,246	41,220
November	73.737	63,978	36.799	44.444	41,286	23,943	27,248	30,255
December	67,690	69,453	41,006	47,162	37,460	31,474	31,409	42,162
Total	879,132	625,249	640,697	559,150	486,748	365,349	618,249	611,644

<sup>\*</sup> Data from R. L. Polk & Co.

## AIRCRAFT PRODUCTION

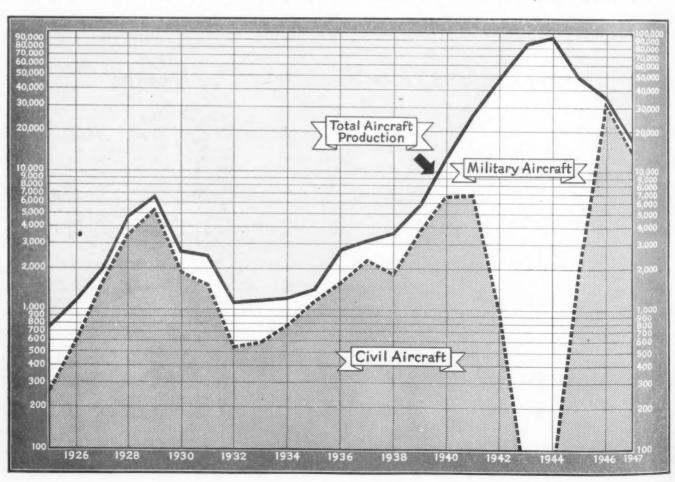
Airplanes, Seaplanes and Amphibians, 1919-1947

	Civil‡	Military‡	Total†	Value;
1919		21111	662	\$8,046,468
1921			302	4,133,108
1923			587	7,737,069
1925	268	447	789	6,673,659
1926	604	532	1.186	8,871,027
1927	1,565	621	1,995	14,504,999
1928	3,542	1,219	4,761	22,002,000
1929	5,357	677	6.631	51,508,120
1930	1,937	747	2,684	~-,~~,
1931	1,582	812	2,468	21,790,000
1932	549	593	1,142	
1933	591	466	1,179	15,859,995
1934	772	437	1,209	,,
1935	1,109	459	1,365	17,454,331
1936	1,559	1.141	2,700	.,,,
1937	2,281	949	3,100	38,664,153
1938	1,823	1,800	3,623	
1939	3,770	2,141	5,911	75,872,587
1940	6,785	6.019	12,871	146,000,000
1941	6,844	19,433	26,277	819,000,000
1942	985	47,836	48,821	2,762,000,000
1943		85,898	85,898	6,696,000,000
1944		96,318	96,318	9,233,000,000
1945	2,047	47,714	49,761	5,141,000,000
1946	34,874	1,330	36,204	362,772,192
1947	15,616	2,102	17,738	671,432,478

† Sources: Odd years 1919 through 1939, as reported by Census of Manufacturers. Other years, various sources. Total units produced 1940-1945 as reported by Civil Aero-

f Sources: Odd years 1919 through 1939, as reported by Census of Manufacturers. Other years, various sources. Total units produced 1940-1945 as reported by Civil Aeronautics Administration.
 Value of airframes 1940-1945, Department of Commerce.
 Partly estimated. ‡ Do not add up to totals shown because of difference in sources.
 Note: The values of engines, propellers and power plant accessories installed in the aircraft are not included in the value of the aircraft reported for 1931 to 1940.
 For 1940 to date, the value of these items are not included in the value of military aircraft only.

## CIVIL AND MILITARY AIRCRAFT PRODUCTION, 1925-1947



CI

Jan Feb Mar Apr May

Jun July Aug Sep Oct

Tot

1

Jan Fel Ma Ap Ma Jun Jun Au Sel Oc

Ja: Fe Ma AI Ma Ju Ju AI Se Or De

## Shipments of Complete Aircraft and Other Products of Aircraft Plants – 1947-1946\*

In Units and Their Value

		The second second
Product	1947	1946
Complete Aircraft For U. S. Military Other Than U. S. Military	2,102 15,616	1,330 34,874
Total Aircraft	17,718	36,204
U. S. Military and Parts	\$494,928,474	\$223,743,735
Other Than U. S. Military		\$170,799,937
Value of Parts for Other than U. S. Military	21,096,247	\$17,715,397
Total Value-Aircraft and Parts	\$692,528,725	\$412,259,069
Value All Other Products incl. Conversions	\$48,103,585	\$83,210,652
Total Value Products Aircraft Plants	\$740,632,310	\$495,469,721

## 1947 CIVIL AIRCRAFT SHIPMENTS \* Classified by Total Rated Horsepower

	1-74 HP	75-99 HP	100-39 HP	9 400 & Over HP	Total Planes
January	298	666	1,179	23	2,166
February	332	455	1.114	13	1,914
March	301	481	977	26	1,785
April	338	621	1.046	33	2,038
May	226	613	777	30	1,646
June	203	373	583	34	1,193
July *	175	268	536	19	998
August	141	270	492	26	929
September	4 4 4	377	477	32	1,028
October	102	252	415	33	802
November	63	156	374	22	615
December	50	158	276	18	502
Total	2,371	4.690	8.246	309	15.616
* SOURCE: Prepared jo Aeronautics Administrati	ointly by	the Bureau	of the (	Census and	the Civil

## 1947 CIVIL AIRCRAFT SHIPMENTS\* By Number of Places

			and More	
	2-Place	3 & 4-Places	Places	Total
January	969	1,176	21	2,166
February	793	1,109	12	1,914
March	789	972	24	1,785
April	964	1,042	32	2,038
May	847	771	28	1,646
June	590	572	31	1,193
July	475	508	15	998
August	434	470	25	929
September	547	431	50	1,028
October	390	364	48	802
November	245	328	42	615
December	229	246	27	502
Total	7,272	7,989	355	15,616

## 1947 Aircraft Engine Shipments and Other Products of Aircraft Engine Plants\* For Military and Other Uses—In Units and Their Value

		-		For Otl	her than U.	S. Military				*
	For U	. S. Military	Customers	Cı	istomers		All	T	otals-All Pro	ducts
		Engines	Parts		Engines	Parts	Other		Engines	All Other
	Units	Value	Value	Units	Value	Value	Products	Units	Value	Products
January	334	\$15,736,609	\$1,611,027	2,528	\$7,109,085	\$2,917,391	\$139,160	2,862	\$22,845,694	\$4,667,578
February		12,932,973	1,647,106	1,765	5,266,831	2,943,682	1,098,029	2,126	18,199,804	5,688,817
March	100	16,598,837	2,248,695	2,457	4,908,589	3,105,279	459,656	2,895	21,507,426	5,813,630
April	430	17,257,072	2,780,284	2,472	6,192,943	3,036,420	455,460	2,902	23,450,015	6,272,164
May		19,495,084	2,971,172	1,773	5,008,286	3,088,994	552,961	2,160	24,503,370	6,613,127
June		19,822,043	5,119,330	1,002	5,249,333	2,755,762	217,800	1,348	25,071,376	8,092,892
July	386	11,433,886	4,653,236	971	2,972,269	2,285,376	184,091	1,357	14,406,155	7,122,703
August	436	13,509,112	4,329,077	511	1,998,797	1,744,940	217,282	947	15,507,909	6,291,299
September	426	18,054,454	4,685,666	691	2,112,257	1,793,566	110,413	1,117	20,157,711	6,589,645
October	471	18,783,310	4,189,707	696	4,509,554	2,081,501	166,585	1,167	23,292,864	6,437,793
November		16,175,423	3,481,085	819	2,107,411	1,758,590	113,554	1,228	18,282,834	5,353,229
December	384	17,248,844	9,006,359	685	1,932,193	1,607,525	77,629	1,069	19,181,037	10,691,513

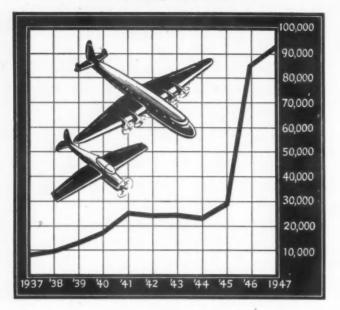
## 1947 Employment in Aircraft and Aircraft Engine Plants Complete Aircraft Plants Aircraft Engine Plants\*

1947	Total Plant Employees	Production Workers	Other Plant Employees		Fotal Plant Employees	Production Workers	Other Plant Employees
January	163,521	116.133	47.388	January	. 33,348	23.561	9.787
February	161,612	114.847	46.765	February	34,642	23,880	10.762
March		115,622	44.202	March		25,976	10,460
April		117,802	43.328	April		24,470	11,269
May		110,459	41,859	May		23,237	11,052
June	145,251	106,600	38,651	June		23,017	10,963
July		105,418	38,862	July		22,446	10,694
August		106,032	38,351	August	. 33,048	22,311	10.737
September	143,302	104,398	38,904	September		22,149	9,990
October	145,338	106.395	38.943	October		23,020	9,934
November		106,826	39,991	November		23,379	9.738
December	449 404	106,695	40,436	December	. 33,131	23,573	9,558

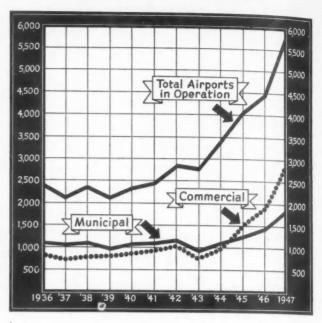
<sup>\*</sup>Bureau of the Census and Civil Aeronautics Administration.

## CERTIFIED AIRCRAFT

As of January of Each Year



## AIRPORTS IN USE



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## Airports By Class and Type, By States

As of January 1, 1948

		TY	PE OF OF	ERATIO				SIZE CI.	ASSIFIC	ATION:	
			CAA Inter		AH			JEEL CL		IV &	Total
States	Commercial	Municipal	mediate	Military2	Others <sup>3</sup>	Total	Sub 11 & I	11	111	Over	Lighted
Alabama	. 44	31	2	17	4	98	54	14	14	16	33
Arizona	. 41	37	7	51	27	163	58	39	37	29	27
Arkansas	49	21	i	0	14	85	51	14	13	7	11
California	. 188	111	10	61	36	406	219	64	33	90	
Colorado	. 100										130
Colorado	. 32	43	2	8	14	99	54	28	8	9	15
Connecticut	. 21	10	1	0	0	32	23	1	3	5	13
Delaware	. 16	2	0	1	3	22	15	4	0	3	6
District of Columbia	. 0	0	0	2	1	3	0	0	0	3	3
Florida	. 49	82	3	60	6	200	58	25	47	70	63
Georgia	. 47	51	4	12	19	133	62	15	27	29	29
Idaho	. 14	52	4	2	21	93	68	13	8	-4	15
Illinois	. 125	27	5	16	8	181	127	39	5	10	32
Indiana	121	28	2	7	5	163	115	29	9	10	
Lowa	106		4		7						24
Iowa	. 400	45	9	1		163	132	22	1	8	12
Kansas	. 76	69	3	25	10	183	130	19	13	21	33
Kentucky	. 48	9	2	3	2	64	53	2	4	5	16
Louisiana	. 25	23	4	8	17	_ 77	42	13	10	12	25
Maine	. 44	23	0	3	6	76	54	4	12	6	22
Maryland	. 32	5	0	7	9	53	26	14	3	10	17
Massachusetts	. 48	21	0	4	2	75	52	4	9	10	19
Michigan	. 107	196		5	6	224	163	36	10	15	29
Minnesota	. 63	62	0	ő	1	126	93	23	4	6	19
Mississinni	48	34	0		6						21
Mississippi	. 90		2	11		103	60	15	16	12	
Missouri	. 79	33	5	7	2	126	87	19	11	9	32
Montana	. 15	56	11	1	15	98	61	18	7	12	25
Nebraska	. 40	42	5	10	8	105	71	17	1	16	20
Nevada	. 19	15	9	8	3	54	20	8	7	19	23
New Hampshire	. 19	12	0	1	2	34	25	3	3	3	8
New Jersey	61	12	0	5	6	84	54	16		6	21
New Mexico	. 35	31	10	10	18	104	61	14	6	23	26
New York	174	42	3	11	11	241	183	27	12	19	43
North Carolina	107	28	1	15	0	151	104				24
North Carolina	. 101		-		-			15	14	18	
North Dakota	. 27	34	6	0	1	68	51	9	2	6	16
Ohio	. 152	34	6	4	3	199	145	36	8	10	31
Oklahoma	. 73	75	2	5	8	163	107	20	13	23	42
Oregon	. 37	46	5	1	17	106	67	9	11	19	27
Pennsylvania	. 148	40	3	5	3	199	150	28	13	8	31
Rhode Island	. 6	1	0	3	1	11	7	0	2	2	3
South Carolina	. 23	34	2	6	5	70	35	10	6	19	15
South Dakota	. 24	34	1	1	2	62	46	5	3	8	9
Tennessee	. 36	21	6	4	4	71	44	13	7	7	22
Texas	184	141	21	CA	60	470	237	100			120
				64	60				55	78	
Utah	, 1	26	9	3	1	46	18	6	13	. 9	19
Vermont	. 8	9	0	0	0	17	13	0	4	0	7
Virginia	. 70	19	3	17	4	113	76	12	11	14	25
Washington	. 58	52	3	14	9	136	78	19	9	30	39
West Virginia	. 29	14	2	0	3	48	34	8	2	4	9
Wisconsin	61	45	2	1	0	109	77	21	6	5	16
Wyoming	. 13	30	5	î	3	52	21	18	6	7	16
Total	2.849	1,818	178	501	413	5,759	3,581	888	526	764	1,281
	-3	-3	210	004	200	41100	9,002	000	040	101	21400

<sup>&</sup>lt;sup>1</sup> Class I airports are for private owners of smaller type aircraft. Class II private owners of largest type aircraft and feeder transport aircraft. Class III present day transport aircraft. Class IV and Over, largest aircraft now in use and those planned for immediate future.

<sup>1</sup> Indicates Army, Navy, Army operated and Navy operated (latter two are municipal or commercial airports temporarily taken over by Army or Navy).

Indicates Army, Navy, Army operated and Alary operated by Army or Navy).

Includes private and miscellaneous government airports.

Sub 1 indicates airports which exist but do not come up to Class I standards.

SOURCE: Civil Aeronautics Administration.

## 15 Year Growth of Domestic Air Lines

## **NUMBER OF COMPANIES, PLANES AND MILES FLOWN**

Year	Number of Operating Companies	Number of Employees	Number of Planes	Average Seats per Plane	Average Speed M.P.H.	Revenue Miles Flown
1933			408	7.59		48,771,553
1934		****	417	8.85		40,955,366
1935		5,917	356	10.34		55,380,353
1936	01	7,045	272	10.67	143	63,777,226
1937	4.77	7,529	282	12.53	147	66,071,507
1938	10	8,955	253	13.63	147	69,668,827
1939	4 77	10,509	265	14.63	147	82,571,523
1940	10	15,800	358	16.52	149	108,800,436
1941	17	18,984	359	17.41	153	133,022,679
1942	. 16	26,447	179	17.60	153	110,102,860
1943	10	30,349	194	17.61	154	103,601,443
1944	16	31,094	279	17.53	155	142,234,034
1945	20	50,470	421	18.00	156	218,189,133
1946	24	69,182	674	25.00	161	311,698,108
1947	28	n.a.	810	30.00	n.a.	‡326,618,887

N.A.—Not available, ‡—Eleven months, Source:—Civil Aeronautics Board,

## PASSENGERS, MAIL & FREIGH CARRIED - FUEL CONSUMED

		Total Passengers Carried	Passenger Miles Flown (000 Omitted)	Express and Freight Carried lbs.	Mail Carried (Ton Miles)	Gasoline Consumed (Gal.)	Oil Consumed (Gal.)
1933	**********************	493,140	173,496	1,510,212	2,567,924	21,839,292	804,961
1934		461,748	187,860	2,133,192	2,461,412	18,872,057	667,775
1935		794,952	313,908	3,822,396	4,132,608	27,065,717	707,066
1936		1,020,931	443,740	6,928,777	5,741,136	30,392,923	675,655
1937		1,102,707	476,603	7,127,369	6,698,230	33,606,770	629,127
1938		1,343,427	557,719	7,335,967	7,422,860	37,218,743	644,768
1939		1,876,051	749,787	9,514,229	8,584,891	46,554,856	726,507
1940		2,959,480	1,147,445	12,506,176	10,035,638	64,906,284	1,087,208
1941		4,060,545	1,491,735	19,209,671	12,900,405	80,757,892	1,258,983
1942		3,551,833	1,481,976	39,968,765	21,066,627	68,030,246	989,103
1943		3,454,040	1,642,597	57,543,591	35,927,042	63,908,388	878,923
1944	****	4,668,466	2,264,282	66,011,669	50,904,986	88,143,732	1,238,941
1945		7,793,875	3,554,714	90,017,200	64,955,466	134,824,120	1,709,566
1946		12,451,856	5,947,956	149,133,000	32,953,307	236,388,751	2,876,250
1947		13,014,034	6,170,795	234,000,000‡	32,840,796‡	n. a.	n a.

t—Eleven months n.a. Not available. Source:—Civil Aeronautics Board

## AIRPORTS BY TYPE

Year	Commercial	Municipal	Intermediate C.A.A. Lighted	Military	Total Airports in Operation	Total Lighted Airports
1936	. 774	1,037	284	235	2,342*	705
1937	727	1,053	278	236	2,299*	720
1938	760	1,092	265	255	2,374*	719
1939	. 801	963	266	250	2,280	735
1940	. 860	1,031	289	151	2,331	776
1941	930	1,086	283	185	2,484	662
1942	1,069	1,129	273	338	2,809	700
1943	. 801	914	239	814	2,769*	859
1944	1,027	1,067	228	1,104	3,427*	964
1945	. 1,509	1,220	216	1,081	4,026	1,007
1946	1,929	1,424	201	936	4,490	1,019
1947	. 2,849	1,818	178	914	5,759	1,281

Does not include some Intermediate CAA Unlighted Airports.

†Civil Aeronautics Administration

## **AERONAUTIC EXPORTS**

U. S. Exports of Aeronautic Products, by Years, 1912-1947\*

		Aircraft	Aircra	ft Engines	Parts, Accessories and Equipment	Total
	Number	Value	Number	Value	Value	Aeronautic Exports Value
1912	29	\$105,805				\$105,805
1913	29	81,750	*****		\$25,802	107,552
1914	34	188,924			37,225	226,149
1915	152	958.019			583,427	1,541,446
1916	269	2,158,395		*****	4,843,610	7,002,005
1917	135	1.001.542			3,133,903	4,135,445
1918	61	768,720	* - * * * -		18,017,781	
1919	44		* * * * * *			18,786,501
1000		215,300		* * * * * *	3,249,226	3,464,526
1920	65	598,274	* * * * * *		554,375	1,152,649
1921	48	314,940	*****		157,608	472,548
1922	37	156,630	147	\$72,819	265,481	494,930
1923	48	309,051	80	65,558	58,949	433,558
1924	59	412,738	146	219,609	165,926	798,273
1925	80	511,282	73	170.793	101,584	783,659
1926	50	303.149	297	573.732	150,329	1,027,210
1927	63	848,568	84	484,875	570,117	1,903,650
1928	162	1,759,653	179	664.826	1,240,244	3,664,723
	348		322			
1929	340	5,484,600	322	1,383,197	2,257,548	9,125,345
1930	321	4,819,669	376	1,634,985	2,363,456	8,818,110
1931	140	1,812,809	307	1,432,229	1,622,649	4,867,687
1932	280	4,358,967	2,356	1,517,682	1,756,421	7,946,533
1933	406	5,391,493	2,903	1,452,341	2,249,172	9,180,328
1934	490	8,195,484	1,009	4,458,701	4,860,567	17,622,938
1935	333	6,598,515	568	2,459,317	5,069,810	14,290,843
1936	527	11,601,893	933	5,182,469	6,060,483	23,143,203
1937	631	21,085,170	1.048	5,946,054	12,105,474	39,404,469
1938	876	37,977,924	1,309	7,899,844	21,948,982	68,227,689
	1 001	07 110 000	1 000	44 400 005		117 007 010
1939	1,221	67,112,866	1,880	14,120,035	36,574,311	117,807,212
1940	3,531	196,265,646	4,986	49,873,823	65,732,004	311,871,473
1941	6,011	422,763,907	8,144	81,692,907	122,472,538	626,929,352
1942	14,603	882,247,253	14,603	160,575,340	352,123,928	1,394,946,521
1943	13,885	1,216,900,646	21,803	243,649,570	684,061,278	2,144,611,494
1944	24,489	1.657.692.974	25,751	335,085,521	833,150,100	2,825,928,595
1945	7,672	656,105,257	9,351	126,209,929	373,294,565	1,163,609,751
1946	2,406	65,293,732	2,490	11,851,372	38,178,056	115.323.160
1947	2,999	74,575,368	4,138	18,075,058	82,943,084	175,596,659
	2,000	14,010,000	4,130	10,075,050	02,343,004	110,000,000

<sup>\*</sup> Machinery and Motive Products Branch, Office of International Trade, Department of Commerce.

## U. S. Exports of Aeronautic Products\*

Segregated by Type of Product for 1944-1947.

	19	947		1946		1945		1944
Type of Product AIRCRAFT	Number	Value	Number	Value	Number		Number	r Value
Airplanes, civil, new and used	1,977	88,448,108	2,243	\$64,200.532	387	89,197,206	****	8
Bombers		457,500		******	1,547	274,938,100	5,149	878,781,026
Fighters		410,000	16	12,800	3,844	242,497,660	6,158	427,908,688
Transports, new and used, cargo and passenger		60,103,435	2	215,932	1,238	120,062,444	1,732	197,910,224
Trainers		5,131,844	41	828,485	550	14,587,777	2,765	72,850,400
Communication			-		42	1,812,751	737	12,205,555
		3,450	50	2,500	10	750	7.268	54,873,560
			54		54		677	13,163,521
Gliders, Lighter-Than-Air	. 36	21,031	94	33,483	9.4	1,008,569	011	19,100,000
AIRCRAFT ENGINES	4,138	18,075,058	2,490	11,851,372	9,351	126,209,929	25,751	335,085,521
PARTS, ACCESSORIES AND EQUIPMENT								
Engine Parts and Accessories		28,838,297		12,855,376		87,496,208		183,586,859
Propellors		1,975,795	1,594	1,007,234	15,688	21,318,969	35,883	51,303,005
Propellor parts and Accessories		1,553,331	****	767.593		14,400.615		33,194,081
Instruments and parts		4,928,739	****	2,192,365	****	11,030,056		22,185,048
Bambrack and other controls		******	****	892,895	****	14,758,164		63,501,550
Bomb sights and parts		69,476		245	2,800	6.645,545	10,492	31,632,937
Parachutes & Other Aerial Delivery Equipment		10,941,700		783.697		1.283,961		6,701,129
			1.364	49.487	12,748	200,924	1,206	186,710
Radio Transmission and Receiving Sets and Parts		4 900 704						206,160,583
		1,308,701	2,119	3,272,752	26,806	138,364,540	***	
Radio Ground Equipment		2,021,332	****	******	****	******		******
Aircraft Ground Handling & Maintenance Equip		2,652,460	* * * *	*******		******	* * * *	145,000
Aircraft Parts and Components		5,124,340	4 4 5 5	******	****	32,605	****	
Parts and Accessories, Other		23,528,913	****	16,356,412	****	77,762,978	****	234,553,198
Total-Aeronautic Exports		\$175,596,659		\$115,323,160	****	\$1,163,609,751	****	\$2,825,928,595

CAP SPECIFICATIONS

• - Model 2211 weighs 3770 lbs.

## GENERAL AND ENGINE SPECIFICATIONS

3 UP 1948 PASSENGER CAR SPECIFICATIONS AN SE

	per Mile Line Numbers	-46466-695-5	222222332222222233	333333333333333333333333333333333333333	
Performance Factor Crankahalt Revolutions		3221 2321 2852 2850 2850 2850 2333 5118	2824 3013 2790 2790 2742 3013 3013 2742 2742 3038 2850	3141 30141 3173 3294 3294 3296 33096 3096 3096 3096 3096 3096	2917 36 3026 36 3113 37 3026 38 3113 39 3272 40 4110 42
J	Performance Facto	38.50 3.44.50 3.44.50 3.30 3.30 3.30 3.30 3.30 3.30 3.30 3	32.28 30.24 30.88 30.88 30.88 30.48	338.5 338.5 339.7 339.7 41.0 17.0	34.5 35.8 35.8 35.0 35.0
89	Hp. (with Accessor (per Cu. In.)	.423 .423 .375 .375 .375 .375 .318 .417 .417	.350 .443 .443 .442 .442 .428 .371	.475 .395 .404 .404 .451 .443 .443	.436 .366 .366 .408 .408 .415 .415
qeu	Weight per Hp. (With Accessories) With Accessories)	40.19 42.00 35.28 35.28 36.42 37.46 43.70 33.12 33.12 35.56 60.94	36.22 41.25 37.46 38.75 45.15 42.67	40.80 42.63 37.88 37.88 39.60 38.81 29.72 61.25	37.16; 43.77 45.26 38.57 39.60 40.44;
net	Weight per Cu. In. 5 Pass. 4 Door Sec	17.02 17.78 114.65 113.48 113.68 114.07 116.05 113.82 113.82 114.83	16.69 16.42 15.64 17.13 16.81 15.86	19.39 16.87 16.02 16.02 16.02 11.30 26.92	16.21 16.01 16.55 15.73 16.15 19.07
ression	.M.9.R 18dW 1A	10000 100000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 100000 100000 10000 10000 10000 10000 10000 100000 10000 10000 100	1000 1000 2400 70 125 70	350 350 1000 1000 1000 1000	000000000
Comp	Pressure (Lb.)	135 140 182 182 185 185 185 185 185 185	160 160 120 120 120 120	120 125 159 159 165 165 165 165 165	55008850
noia	Standard Compress (f—of) oitsA	6.30 6.30 6.80 7.25 7.25 7.25 7.25 6.50 6.50 6.70 7.50	6.60 6.70 6.73 7.30 7.20 6.50 6.75	7.00 6.50 6.50 7.00 7.00 7.00 7.00	6.6.6.6.6.6.6.6.6.6.6.6.6.6.6.6.6.6.6.
d R.P.M.	With Standard Accessories	202-2000 202-2000 267-2000 272-1800 272-1800 272-1800 168-1100	175-1600	185-1200 185-1200 204-2000 204-2000 213-2000	186-1100 186-1100 190-2000 190-2000
Max. Torque at Specified With Bare Engine		206-2000 206-2000 276-2000 283-1600 283-1600 283-1600 283-1600 283-1600 270-1600 270-1600	92-1800 192-1200 184-1200 180-1200 180-1400 180-1400 214-1600 18C-2000	138-1600 208-1600 190-1200 190-1200 210-2000 218-2000 226-2000 286-2000 70-2200	172-1200 186-1400 186-1400 192-2000 192-2100 134-2000 176-1600
rake Hp. ed R.P.M.	With Standard Accessories	105-3500 105-3500 133-3300 130-3200 130-3200 130-3200 83-3200 83-3200	90 3600 89-3600	94-3400 94-3400 104-3800 104-3800	87.5-3200 87.5-3200 101.5-3600
Max. B at Specifi	With Bare Engine	110-3600 110-3600 110-3600 150-3400 150-3400 150-3400 114-3600 135-3400	46.5.3200 109-3600 90-3300 100-3800 121-4000 121-4000 100-3600 100-3600 100-3600	82-3800 112-3400 100-3400 110-3600 110-3600 115-3600 115-3600 145-3600 160-3600 40-3600	95-3600 83.5-3400 83.5-3400 107.5-3700 107.5-3700 80-4000 72-4000
Taxable Horsepower		300.6 370.6 39.2 39.2 28.3 33.8 33.8 33.8	277.9 26.3 30.5 30.6 30.6 30.6 30.6	23 23 23 23 23 23 23 23 23 23 23 23 23 2	25 33 33 4 4 5 3 3 3 3 3 3 3 3 3 3 3 3 3
Total Piston Displacement (Cu. In.)		248.0 2248.0 320.2 346.0 346.0 226.6 44.0	133.0 236.6 236.6 226.0 226.2 226.2 226.2 226.2 239.4	172.6 234.8 234.8 238.1 2538.1 257.1 257.1 288.0 356.0 91.0	217.8 239.2 239.2 248.9 169.6 148.5
7	Number of Cylinders, Bore and Stroke (In.)	8-33/32×44/8 8-33/32×44/8 8-31/34/4/8 8-31/34/4/3 8-31/34/4/3 8-31/34/4/3 8-31/44/4/8 8-31/44/4/8 8-31/44/4/8	4-31/44 6-37/6×41/4 6-37/6×41/6 6-3.0×4.40 8-3.187×3.75 6-39/6×49/6 8-3×6×49/4 12-27/6×33/4 8-33/6×33/4	6-33/483 6-33/483 6-33/484 6-33/484 6-33/484 6-33/483 6-3	6-31/x43/8 6-39/6x4 6-39/6x4 8-31/x33/4 6-31/x33/4 6-35/6x43/4 6-3x31/x33/4
Tire Size (In.)		6.50/16 6.50/16 7.00/15 8.20/15 8.20/15 7.50/16 6.00/16 7.50/15 7.50/15 7.50/15 7.50/15 7.50/15 7.50/15	5.50/15 7.10/15 6.00/16 6.00/16 7.10/15 7.10/15 7.10/15 7.00/16 8.50/15	6.40/15 6.00/16 6.50/16 6.50/16 7.00/15 7.00/15 7.00/15 5.00/12	6.70/15 6.00/16 6.50/16 6.50/16 6.50/15 6.50/15
1000 t	Shipping Weight (L Cheapest 5 Pass., 4 Sedan or Equivalen	3720 3910 4190 4235 4370 4875 3130 3523 3972 4300	3448 3248 3213 3245 3375 4015 3288	2846 33462 3332 33508 33750 4140	3030 3330 3460 3415 3520 2735 3280
	peol on	864764 646464 65964 67172 67172 67173 6717	62 665,32 661,22 661,4 661,4 671,6 691,6	681,44 657,84 657,84 664,44 664,86 664,86 664,86 664,86 664,86	86 6514 66514 66514 66154 6154
	Width	\$25.55 \$2	755 755 755 731 721 721 731 735 735 735 735 735 735 735 735 735 735	741,2 753,8 755,16 755,16 765,16 7715,32 7715,32 7715,32	735% 7634 7634 7634 7634 681532 681532 681352
gnuber.	Length—Including and Bumper Guard	2071/2 2123/8 217/8 214/8 214/8 2251/32 2251/3/4 1973/4 2163/4 2163/4 2343/4	186 2071,4 2947,2 1983,6 203 2071,2 2071,2 203 218.05 2013,4	200 2093/16 204 213 204 213 213 2045/8 2125/8 153	1963/ 2041/2 2101/4 2101/4 19021/32
	Твея	6115,16 6235,8 63 53 63 63 600,32 619,16 611,6	60 609/32 609/32 60 60 60 60 60 60 60 60 60 60 60 60 60	5911 6611/2 6611/2 6611/2 6612/2 6642	92222222 54444
	fnora	587/8 588/8 589/8 589 589/2 577/8 577/8 5713/6	58 58 77 58 58 58 58 58 58 58 58 58 58 58 58 58	571/2 58 58 58 58 58 58 58 5911/32 603/32 48	78888888888888888888888888888888888888
(in) seedleedW		124 128 128 128 138 136 14 121 127 145 127 2	123 123 123 123 123 123 123 123 123 123	82222223 82222233 822	122 122 123 123 123 123 123
	PASSENGER CAR MAKE AND MODEL	Special 40 Super 50 Roadmaster 70 62 62 602 FL-FK FL-FK C-38 C-38 C-36 C-40	Wheeler D-2 8-11 8-11 B-34 8744 8784 6, 481-482 6, 483-484 6, 483-484 6, 483-484 7, 481-482 8764	600–4840 hassador 4860 Dynamic 60–68 Dynamic 60–68 Dynamic 60–68 Dynamic 70–78 Futuranic 98 8–2201, 2211 r 8–2202, 2232 8–2206, 2233	Plymouth P-15 Pontiac 6-26 6-26 6-26 8-27 8-27 Studebaker 76 Willive 683
	Max. Brake Hp. Max. Torque (Lb. Ft.) Compression at Specified R.P.M. at Specified R.P.	Hear Max. Brake Ho.  Langth—Including Bumper Guards and Bumper Guards and Bumper Guards  Width  With  Total Piston  Compression  Straded R.P.M.  Total Piston  Compression  Total Piston  Compression  Total Piston  Compression  Standard  Mith  With  Pressure  Compression  Standard  With  With  With  With  With  With  Pressure  Compression  Standard  Standard  Standard  Weight per Hp.  Standard  Standard  Pressure  Compression  Accessories  Standard  Bare  Standard  Standard  Standard  Weight per Hp.  Brass. 4 Door Sedan  Standard  Pressure  Standard  Standard  Standard  Standard  Standard  Pressure  Standard  Standard  Standard  Standard  Standard  Standard  Standard  Standard  Standard  Pressure  Compression  Accessories  Standard  Bare  Standard  Standard  Accessories  Standard  Accessories  Brass., 4 Door Sedan  Weight Accessories  Standard  Weight Cu. In.)	PASSENGER CAR	PASSENCER CAR  MACCEL	PASSINGE IN PASS

# PISTONS, RINGS AND CONNECTING RODS

		Line Numbers	-44407005-5	22 22 23 23 23 23 23 23 23 23 23 23 23 2	333333333333333333333333333333333333333	4 4 4 4 9 3 8 4 5 4 5 4 5 6 5 6 6 6 6 6 6 6 6 6 6 6 6	
RODS		(SO) IngieW	28.46 33.00 33.00 33.00 33.00 33.00 33.00 31.00	21.00 34.10 17.35 29.60 34.24 31.36 29.60 25.08	24.00 36.25 28.00 28.00 28.00 28.00 35.70 35.40	37.00 37.00 31.70 20.48 33.30	
CONNECTING	(	Material (S. AE. No.	1045 1045 1035 1035 1035 1035 HMS HMS HMS	3140 HMS SF SF SF C-1041 1030 SF SF	Steel X-1335 X-1335 X-1335 X-1335 X-1335 SF SF SF SF	SF 1035 1035 1035 1035 DFS DFS	
CONN		Length (In.) Center to Centur	758 83,4 83,4 883,4 883,4 8863,4 8863,4 8863,4 8863,4 8863,4 8863,4 8863,4 8863,4 8863,4 8863	69% 8 7.13% 7.00 7.00 7.00 8% 83% 7.00 7.40	63.4 8.4 8.4 8.4 7.13.16 7.13.16 9.15.16 1.15.16	715/16 79/16 79/16 79/16 63/8 81/8 81/32	ston,
		Average Clearance (In.) (In Piston)	.00035 .00035 .00035 .00007 .00007 .00025 .00025 .00025	.00025 .00025 .00035 .00035 .00015 .00015 .00015	20000000000000000000000000000000000000	.0002 PuF PuF PuF .0002	—No or None, —Oval, —Locked in piston, —Push fit, —Locked in rod, —Solid skirt,
PIN		Locked in	00 00 00 to to to to to to to			receases	- No - Cora - Lock - Solic
WRIST PIN		Oismeter (In.)	.8125 .8125 .8750 .8750 .8750 .8750 .8593 .8593 .8593	.750 .8593 .8593 .8502 .7502 .750 .750 .750	8120 8746 85593 85593 85593 8750 8750 8750 8750	.8593 9375 9375 9375 9375 7500 .8750	Person
		Length (In.)	2.887 2.687 3.062 3.062 3.062 3.062 2.875 2.750 2.750	2.875 2.875 2.875 2.812 2.812 2.837 2.837 2.812 2.812	2.632 2.824 3.156 3.156 2.968 3.015 3.015	2.750 3.062 3.062 2.875 2.875 2.625 2.875	
		Expanders Used	ZZZZZZZZ	ZZZZZZŻ	ZZZZZZ	ZZZZZZ	·i-
		Maximum Wall Thickness (In.)	(a) (b) (170 (c) (d) (d) (d) (d) (d) (e) (e) (e) (e) (e) (e) (e) (e) (e) (e	169 169 147 178 128 161 (k)	(a) 172 172 155 155	.162 .175 .150 .150 .150	y. S. Seed ste
	ession	Averate Gap (In.)	200000000000000000000000000000000000000	0000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	eel, xel alto xel alto l. L.
SDI	Compression	(.nl) AsbiW	.0937 .0937 .0781 .0781 .0781 .0781 .0781 .0937 .0937		0932 0937 0937 0937 0937	.0937 .0937 .0937 .0937 (f) .0937 .0937	Cast alloy steel,  —Chrome-Nickel alloy,  —Dropped Forge Steel,  —Flectroplated,  —Floating,  —Flat head,  —Harcules,  —Harmanganese forged steel,  —Lynite,
PISTONS RINGS		Number Used	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	панананана	~~~~~	Cast alloy Chrome-N Dropped J Electropla Floating. Flat head. High man
ISTON		Maximum Wall Thickness (In.)	125555555555555555555555555555555555555	147 147 147 147 147 147 147	55 55 55 55 55 55 55 55 55 55 55 55 55	150 150 150 150 150	CAS-COCO-COCO-COCO-COCO-COCO-COCO-COCO-C
۵.		Average Gap (In.)	200000000000000000000000000000000000000	012333310000000000000000000000000000000	5555555555	000000000000000000000000000000000000000	
	0	(.nl) dibiW	1875 1875 1875 1875 1875 1875 1862 1562 1562		1862 1875 1875 1875 1875 1865 1865	1875 1875 1875 1875 1875 1875 1875	d Bohn A
		Number Used	0000000	-00000000-0		0u	rica an ica,
	Gin.)	Compression	. 166 . 182 . 156 . 169 . 169	176 164 177 195 177 177 164 164	(h) 1187 1156 1156	169	of Amer SS Corp of Amer of Amer
	Ring Grove Depth (in.)	110	172	.172 .172 .173 .179 .179 .179	255555	172 194 189 189 185	middle Co. cond Brass no Co. o malloy malloy malloy mis oxide mie.
	age te (In.)	Trial to motto8	.00185 .00185 .0005 .0005 .0005 .0007 .0007	.001 .0025 .0017 .001 .001	.0007 .0007 .0007 .0007 .0015 .0015 .0007	.001 .0020 .0020 .0020 .0015 SeF SeF	Top .163, middle .148. Aluminum Co. of America and Bohn Aluminum and Brass Corp. Aluminum Co. of America. Aluminum aloy. Audminum aloy. Autothermic. Autothermic. Can ground.
	Average Clearance (In.)	Top Land	.0265 .0285 .0285 .0215 .0215 .0215 .0305 .0305	.0305 .0305 .0235 .0225 .017 .016 .0175	0.161 0.216 0.216 0.255 0.0255 0.0255 0.0255	.0305 .0235 .0235 .0225 .0255 .0150	PA A PA PO
PISTON		Length (In.)	4.328 4.328 4.328 4.125 4.125 4.125 3.875 1.906	3.875 3.20 2.98 3.26 3.75 3.18 3.10 2.198	3.375 4.031 4.031 3.937 3.837 3.875 3.875	3.687 3.593 3.593 2.937 2.93 3.750	
PIS		Weight (Oz.) Without and bush nique of the metal of the m	13.77 17.11 19.15 19.15 19.15 19.15 19.15 16.50 16.50 16.50	18.50 14.60 13.12 15.70 16.70 16.70 13.40	13.81 18.50 18.50 16.00 16.00 19.50	16.00 27.10 27.10 24.70 16.00 8.48	94.
		Features	C. Tu, Trs 3. Tu, Trs 75, An 15, An 15, An 16, C. Sp 18, C. Sp 18, C. Sp 18, C. Sp	S. S	Ss. St. O. To Ss. St. O. To Ts. C. Ao Ts. C. Ao Au Au Av Av	US, C	(e)—Top .150, middle .135. (f)—Top .0837, middle .125. (f)—No. 1—107. No. 2—154. (h)—Upper .1875, lower .136. (k)—Upper .1875, lower .136. (m)—Upper .1846, lower .1756. (n)—Upper .1846, lower .1756.
		IsineteM	**********	SCARARARA SC	<b>e</b> eeeeeee	SYLASSON	Top Top Top Top Top Top Top Top
		Маке	A-B A-B A-B A-B A-B	Herc Ster Own Own Ster	00wn 00wn 00wn 00wn	00wn 00wn AC AC	<u> </u>
	Number of	Cylinders, Bore and Stroke (In.)	8-9-9-2-x44-1	4-31/4×4 6-31/6×41/4 6-31/4×4/8 6-31/4×4/4 8-31/6×33/4 6-31/6×4/3/8 8-31/6×4/3/8 8-31/6×4/3/8 8-31/6×3/4 8-31/6×3/4	6 6 33 % % % % % % % % % % % % % % % % %	6-31/44/3/8 6-39/8/4 8-31/6/4 8-31/4/3/3/8 8-31/4/3/8 8-31/4/3/8 8-31/4/3/8 6-33/6/4/3/8	ring groove the same.
		PASSENGER CAR MAKE AND MODEL	Buick Special 40  Cadillac Roadmaster 70  Cadillac 62  Charolet FJ-FK  Chrysler C-39  Crysley C-30  Crysley C-30	Davis—Coupe D-2 De Soto S-11 De Soto D-2 Dodge B-1-48 Frazer F-485-F-486 Hudson B, 481-482 Kaiser K481-4482 Lincoln S976H Mercury 8876H	Nash 600-4840 Oldsmobile Dynamic 80-88 Dynamic 70-78 Dynamic 70-78 Dynamic 70-78 Packard 8-2201, 2213 Super 8-2202, 2232 Clust. 8-2205, 2233	Plymouth 6-26 Pontiac 6-26 6-28 8-28 8-28 Studebaker 7G Willys 663	ABBREVIATIONS  —Not used on top groove.  —Retained at end.  —Diameter at bottom of oil ring groove  (a)—Upper, 180, lower 140,  (b)—Upper, 170, lower 150,  (c)—Upper 187, lower 150,  (d)—Upper 187, lower 150,  (d)—Upper 187, lower 150,  (d)—Upper 187, lower 150,  (e)—Upper 187, lower 150,
		Line Numbers	-26480788015	222222222222222222222222222222222222222	333333333333333333333333333333333333333	33 33 33 42 42 42	888 eee

# CONNECTING ROD AND CRANKSHAFT BEARINGS

			Line Number	12648919121	222222222222222222222222222222222222222	*****	4448337	
			No. 9			23/ <sub>32</sub> x		
			No. 8			13/6x		-Steel Backed.
			No. 7			23 6, x15,8		p—Separate. Si—Slip-in. E—Solid. b—Special Alloy—S Y—Yes.
		=	No. 6			231/64x15/16		Sep—Sep Si—Slip So—Soli SSb—Spe Y—Yes
		ter and Lengi	No. 5	29/16x125/32 29/16x125/32 213/16x215/32 245/4x23/32 245/64x23/32 245/64x23/32	2.406x2.00	23164x15/16 22116x15/8 22176x15/8 22176x15/8 22176x15/8 11176x	21/2x17/8 21/2x17/8	
+	BEARINGS	Journal Diameter and Length	No. 4	21/2x15/16 22/2x15/16 22/2x15/16 22/2x15/16 22/2x17x11833 22/2x17/8 24/5x17/8 24/5x17/8 24/5x17/8 24/5x17/8 24/5x17/8 24/5x17/8 24/5x17/8		231,64 x 1 3,4 221,16 x 1 3,4 21,16 x 1 3,6 21,16 x 1 3,6 24,36 x 1 3,6 24,36 x 1 3,6 24,36 x 1 3,6 11,16 x 1 3,1 13,6 x 1 3,1 14,6 x 1 3,1 15,6 x 1 3,1 16,7 x 1 3,1 17,6 x	21/2x17/6 25/8x19/16 25/8x19/16 21/32x17/6 21/32x17/6 27/16x17/32 27/16x17/32 27/16x17/32	lay.
CRANKSHAFT	MAIN BE		No. 3	2716×158 2716×158 2176×158 2.499×1968 2.499×1968 2.499×1968 2.499×1968 2.499×1968 2.495×1968 2.495×1968 2.495×1968 2.495×1968 2.495×1968	2.00x1.62 22/2x15/16 22/2x15/16 2.499x2.25 2.34x15/16 2.499x1.625 2.499x1.625 2.498x1.625 2.543x1.625 2.543x15/16		21/2x1/32 21/2x1/32 21/3x1/1/8 27/16x1/1/6 27/16x17/16 27/16x17/16 27/2x11/8 2/2x1/8	-Babbitt Over
CRAN			No. 2	23/x15/16 22/3x15/16 22/3x10/31 2499x1156 2499x1156 2499x1156 2499x1156 2499x1156 2493x1156 249x1157 245/4471/8	2/2x15/6 2/2x15/6 2/2x13/2 2-498x1-36 2-39x1-5/6 2-498x1-375 2-312x1-375 2-312x1-375 2-312x1-375 2-312x1-375	23/64×136 23/64×136 23/64×136 23/64×136 23/64×136 23/64×136 23/64×13/6 23/64×13/6 11/6×	21/2x1/32 21/3x13/6 21/3x13/6 21/3x13/6 21/3x13/6 2/2x11/8 2/2x11/8	Durex—Steel Backed—Babbitt Overlay Pront. Floating bearings -Moraine Durex 300. No or None.
			No. 1	26/6x117/64 26/6x117/64 26/8x117/64 2.499x1.156 2.499x1.156 2.499x1.156 2.499x1.156 2.499x1.156 2.499x1.156 2.495x1.156 2.495x1.156 2.495x1.156 2.495x1.156 2.456x1.156 2.456x1.156	2.00x1.56 2!/x115/6 2!/x115/6 2.498x1.27 2.498x1.50 2.28x19/3 2.28x19/6 2.38x19/6 2.240x.841	23/64X15/6 23/64X15/6 23/64X11/32 23/64X11/32 23/64X11/32 23/64X13/32 23/64X13/32 17/32X	2)2x115/64 2)2x11/4 2)2x11/4 23/8x11/4 23/8x11/6 22/6x15/16 2/2x19/16 2.250x1.301	Dsb—Durex—Steel Backed—Front. F—Front. MD—Moraine Durex 300, N—No or None. R—Rear
			mid2 to aqyT	SSSZZZZSZZZ	ZZZZZZZZ	Z ZZZZZZZZZ	ZZZZZZZ	
			Clearance (In.)	.0016 .0016 .0016 .0016 .0016 .0016 .0012	0012	888888888888888888888888888888888888888	000000000000000000000000000000000000000	,
			Material	Dosp Bash Bash Bash Bash Bash Bash Bash Bash	BSP BSP BSP BSP SSP SSP SSP SSP SSP SSP	BSB BSB BSB BSB BSB BSB BSB BSB BSB BSB	BSb Bab Bab Bab Bab Bab Bsb	
			Removable work	<b>&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;</b>		> >>>>>>	>>>>>>	
			Type	20000000000000000000000000000000000000	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		××××××××	ermax
	(-ul	blay (	Amount of End	000000000000000000000000000000000000000	905	900000000000000000000000000000000000000	600000000000000000000000000000000000000	with Tin Base (Bermax ked.
		kq u	End Thrus! take	mmmmcocccc	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	æ	E0044FF	TinB
			Counterweights	∞∞∞∞∞∞∞∞∞∞	× ××××××××××××××××××××××××××××××××××××	© 48rr®®®®®®	►0000040	with ked.
		J	Vibration Dampe	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	No Yes	No	Y 88 Y 8	, lined
			Reds and Pins mort bevomeR	******	-		4444444	Babbitt.  Bronze back, lined with Tin Base (Bermax optonal.  Babbitt—atec backed. Center.
GS			Type of Bearing	Spun Spun Sep Sep Sep Sep Sep Sep	Sep	September Septem	Sep	
BEARINGS	earing		Type of Shim	SSSSSSSSSS		Z ZZZZZZZZZ	ZZZZZZZ	Bab Bbt Bbt
D BE	Lower Bearing		Average End Play (In.)	.0075 .0075 .0075 .0075 .0085 .0085 .0085	.007 .007 .007 .007	0.0000000000000000000000000000000000000	0095 0095 0095 007	
CONNECTING ROD	Lo		Average Clearance (In.)	.0012 .0012 .0012 .0012 .0012 .0012	.00012 .00019 .00010 .00010		000000000000000000000000000000000000000	
NECT			Isitefial	Bab CONM CONM CONM BAD BSD BSD BSD	BSP BSSP BSSP BSSP BSSP BSSP BSSP BSSP	SSC SSP SSP SSP SSP SSP SSP SSP SSP SSP	Bab Bab Bab Bab Bab Bab Bab	
CON	Crankpin	Journal	Diameter and Length (sedont)	x17,32 21,415,6 24,415,6 24,59x2,294 24,59x2,294 24,59x2,294 24,59x2,294 24,59x1,32 2,50x17,32 2,50x17,8 2,50x17,8	1.375x.870 2/6x1/32 2/5x1/32 2.234x1.400 2.138x1.755 2.126x1.625 2.126x1.625 2.126x1.375 2.21,6x15,6 2.126x1.375	2.138x1.752 1.875x1.248 2.00x1.436 2.9x11.4 2.9x11.4 2.2x11.4 2.2x11.4 2.2x11.4 2.2x11.4 2.2x11.4 2.2x11.4 2.2x11.312 2.2x11.312 2.2x11.312	2)/ex1 2)/ex1 2)/ex19/32 2/4/16 2x11/16 2x11/16 13/6x11/8 1.875x.899	001 to .003.
		PASSENGER CAR	MAKE AND MODEL	Buick Special 40 Super 50 Super 50 Cadillac 61 Chevrolet FJ-FK Chrysler C-38	Crosley CC Davis Coupe S-11 De Soto B-11 Dodge S11 Ford B-1 Frazer F 485-F486 Hudson B, 481-482	600-4040 Ambassador 4860 Dile. Dynamic 60-68 Dynamic 70-78 Dynamic 70-78 Futuramic 98 8-2201, 2211 Super 9-2202, 2232 Cust. 8-2206, 2233	Playboy A-48 Plymouth 6-28 6-28 6-28 6-28 8-27 8-27 7G 7G Willys 663	ABBREVIATIONS  -Lower bearing size.  +Bearing inser.  (b)—Rear 1905 to .002; Others .001 to .003.  (c)—S.A. E. 13 or equivalent.
			Line Number				Ma 64 Ma	ABBRE - GO

## VALVES, INTAKE AND EXHAUST

			Line Numbers	-00480000000	23222222222222	333 330 28 33 34 33 35 35 35 35 35 35 35 35 35 35 35 35	38 88 94 54 88 88 94 54 88 88 94 54
		3)	Out of Engine	2.343 2.343 2.210 2.210 2.200 2.000 2.000 2.000	2.000 2.000 2.410 2.410 2.343 2.343 2.340 2.340	2.093 2.093 2.625 2.625 2.625 2.625 2.625	2.000
	8 0	Length (In.))	Valve Open	1.593 1.593 1.578 1.578 1.578 1.375 1.375	1.375 1.375 1.375 1.306 1.306 1.840 1.840	1,437 1,343 1,937 1,937 1,406 1,406 1,406	1.375 1.593 1.593 1.593 1.437 1.750
	Springs	7	Valve Closed	1.937 1.937 1.921 1.921 1.921 1.750 1.750 1.750	1.750 2.130 2.130 2.130 1.670 1.670 2.130 2.130	1.750 2.250 2.250 2.250 2.250 1.750 1.750	1.750 1.906 1.906 1.906 1.806 2.093
		e(Lb.)	Valve Open	777	1111 1111 77 77 110 159 80 110 116	883 1000 1000 1000 1400 1400 1400 1400 140	101
		Pressure(Lb.	Valve Closed	30 22 22 23 23 24 4 4 25 25 25 25 25 25 25 25 25 25 25 25 25	421/2 421/2 381/2 381/2 47 77 40 47 881/2	33335555339 633355555339	421/2 591/2 591/2 591/2 57
ALVE.			Lift (In.)	225 225 2375 2375 2375 2375 2375 2375 23	250 2375 292 292 292 292 292 292	342 342 342 342 342 342 342	2375 296 296 296 312 343
UST		(.nl)	Stem Diameter	3.22 2.23 2.24 2.34 2.34 3.34 3.34 3.34	3339 3339 3339 3339 3339 3339 3339 333	339	343
EXHAUST VALVE	Finserts Used?		Speal stream!	ZZZZZZZ>>>Z	Z>>>>ZZZZZ>>	2222222	>ZZZZZZ
	Seat		Angle (Deg.)	****	30 445 445 445 445 445 445 445 445 445 44	445 455 455 455 455 455 455 455 455 455	4454445
		(.nl	Port Dismeter ( Minimum	031 031 250 250 250 375 375	375 376 376 340 340 377 377 340	.125 .312 .250 .250 .250 .250 .250	1.281 1.312 1.312 1.187 1.125 1.125
		(Inl)	Head Diameter	343 343 343 343 343 343 343 343 343 343	250 250 250 250 250 250 250 250 250 250	421 421 421 437 437	281 281 281 281 281 281
		(.nl)	Overall Length	55.109 55.250 55.515 55.515 55.515 55.875 3.934	4.781 5.537 5.730 5.094 4.845 4.845	2.786 2.796 2.796 2.796 3.796 3.875	5.781 5.718 5.531 5.531 5.531 5.218
			Material	2000 <b>8</b> 33330000	COS SAS COS COS COS COS COS COS COS COS COS CO	Steel AS AS AS AS AS AS AS AS AUS AUS AUS	©220000 01200000000000000000000000000000
	Маке			OWN WERREN	Here WR WR Own	Var Var Var	Wat Wat Was
			enign3 to tuO	2.343 2.343 2.343 2.125 2.000 2.000 2.000	2.000 2.410 2.410 2.410 2.500 2.340 2.340 2.340	2.093 2.093 2.625 2.625 2.625 2.625 2.625	2.000
		Length (In.)	Nalve Open	1.593 1.593 1.578 1.578 1.578 1.375 1.375 1.375	1.375 1.375 1.840 1.306 1.840 1.840 1.840	1.437 1.937 1.937 1.937 1.937 1.406 1.406	1.375 1.593 1.593 1.593 1.437 1.750
	Springs	ŭ	Valve Closed	1.500	1,750 2,130 2,130 2,130 1,670 1,670 2,130 2,130	1.750 1.887 2.250 2.250 2.250 2.250 1.750 1.750 1.750	1.750 1.906 1.906 1.906 1.656 2.093
		re(Lb)	Valve Open	7777 444 445 11113 132 133 133 134 135 135 135 135 135 135 135 135 135 135	77 77 77 110 110 80 80 80 110 78	883 14000000000000000000000000000000000000	101111111111111111111111111111111111111
		Pressure (Lb)	Valve Closed	3327 3327 4421/2 4221/2 33 4221/2	421/2 381/2 381/2 47 77 40 47 54		421/2 5591/2 5591/2 57 57
	Lift (In.)			348 347 335 335 335 335 347 375 375 375	250 248 248 248 292 292 292 292	343 342 293 242 342 342 342	375 296 296 296 296 343 343
VALVE		(.nl)	Stem Diameter	372 372 372 372 372 372 372 372 372 372	324	341 342 342 342 342 341	242222222 2422222222 2432222222
NTAKE	at		SpeeU streen!	zzzzzzz>>>z	Z>>Z>Z>ZZZZZZ>	ZZZZZZZ	>2222ZZ
=	Seat		Angle (Deg.)	****	30 445 455 455 455 455 455 455 455 455 45	300 300 300 300 300 300 300 300	4 4 5 3 3 3 3 4 5 4 5 5 5 5 5 5 5 5 5 5
		(.nl	Port Diameter ( muminiM	1.125 1.375 1.500 1.500 1.500 1.500 1.406 1.406 1.050	1.250 1.466 1.406 1.340 1.375 1.375 1.375 1.375	1,312 1,593 1,187 1,187 1,187 1,187	1.406 1.375 1.250 1.250 1.187
		(.nl)	Head Diameter	1.531 1.681 1.881 1.881 1.640 1.531 1.531 1.531	1.5480 1.5480 1.547 1.510 1.510 1.510 1.510 1.510	1,468 1,562 1,562 1,562 1,562 1,562 1,562 1,571 1,671	1.593 1.593 1.468 1.468 1.343 1.468
		(.nl)	Overall Length	55,109 56,109 56,109 56,515 56,515 56,515 56,675 56,675 56,675	4.781 4.757 4.818 4.818 5.187 5.187 4.815	4.781 5.533 5.786 5.786 5.786 6.218	6.718 5.718 5.531 5.531 6.218
			Material	3140 3140 3140 3140 3140 3140 AS AS	66 9442 8845 8845 8845 8845 8845 8845	Steel ASS CNS CNS CNS	COO O O O O O O O O O O O O O O O O O O
			Маке	T-R T-R WR WR Var Var	Herc Var Var WR WR WR	Var	VAR WR
		PASSENGER CAR	MODEL	Buick. Special 40  Super 50  Cadillac. Roadmaster 70  Cadillac. 62  Chevrolet FJ-FK  Chrysler. C-38  C-39  Crosley. CCC	Davis—3 Wheeler D-2 De Soto D-34 Ford B7HA Frazer F485-F486 Hudson 6, 481-482 (Kaiser K481-482 Lincoln 878H Mercury 89NM	Nash Ambasador 4860 Oldsmobile Dynamic 60-68 Dynamic 70-78 Dynamic 70-78 Dynamic 70-78 Dynamic 70-78 Dynamic 98 Dynamic 8-2201, 2211 Super 6-2202, 2222 Clost. 8-2206, 2232 Playboy A-84	Plymouth P-15 Pontiae 6-26 6-26 8-27 8-27 8-27 8-27 154 8-30 154 8-30 8-30 8-30 8-30 8-30 8-30 8-30 8-30

ABBREVIATIONS

†—Outer Valve Spring Only:
Inner: 20 lb.; 1.6562 in.—valve closed.
51 lb.; 1.3125 in.—valve open.
1.9052 in. out of engine.
‡—Lower—NE8455 Steel—Upper Austenitic

(a)—X. C. R. or 2112. (b)—Steine 8790; Head N82130. (c)—Stiirrotne steel, AS—Alloy Steel, Aus—Assentito Steel, CNS—Chrome—Nickel Steel,

ES—Extruded Steel,
Herc—Hercules,
N—No of None,
Opt—Optional,
T-R—Thompson or Wilcox-Rich Div,

Var-Various.
WR-Wilcox-Rich Div.

# TIMING GEARS, VALVE TIMING AND LUBRICATION

			Line Number	-26460780015	22 22 23 23 23 23 23 23 23	333333333333333333333333333333333333333	446333	
1			Oil Cooler Make	NN	N N N N N N N N N N N N N N N N N N N	S SSSSS	NNNNN	
		10	External Oil Filt	HALL NO O O O O O O O O O O O O O O O O O	Paricipal Michael	Pu NN O O O O	No N	
		ı	Floating Type Oi	V V V V V V V V V V V V V V V V V V V	NO O NO	2222222 2222222 2222222 2222222 2222222	NO ON NO N	
		98	Oil Pressure Gag	SW. GGGGGGGG	Aul Aul KS	ACCCCSS	AAC AAC SWW	
-			Crankcase Capac	200011111000	20000010000000000000000000000000000000	**************************************	SOUDDOOD SOUR	TC—Top Center. Var—Various. Y—Yes.
TION			Lbs. Pressure will Opens Relief Val	32 : : : : : : : : : : : : : : : : : : :	33 35 55 55 55 55 55 55	999999999999999999999999999999999999999	40 38 40	Top (Vario
LUBRICATION			Normal Oil Press Lbs. at M.P.H.	45-35 45-35 25-30 25-30 25-30 14-39 50-30	35 45 50 45 35 30 40 60 45	30-20 30-20 30-20 30-20 30-20 30-20	999988	Var V
LUB			Pump Type	000000000000000000000000000000000000000	800000000000000000000000000000000000000	222222222	92 92 92 93 93 95 95 95 95 95 95 95 95 95 95 95 95 95	
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	Pressure to	86	Camehaft Bearin	<b>&gt;&gt;&gt;&gt;&gt;&gt;</b>	>>>>>>	>>>2>>>>	<b>&gt;&gt;&gt;&gt;&gt;</b>	
	Pre		Wristpins	ZZZ>>>>ZZZZZ	>22222>2222	>>>>>>	Z>>>>Z	lash
	io		Connecting Rods	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	<b>&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;</b>	<b>&gt;&gt;&gt;&gt;&gt;&gt;</b> ;	>>>>>>	orp.
			Main Bearings	<b>&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;</b>	<b>&gt;&gt;&gt;&gt;&gt;&gt;&gt;</b>	<b>&gt;&gt;&gt;&gt;&gt;&gt;</b>	<b>&gt;&gt;&gt;&gt;&gt;&gt;</b>	In Bar
			9d <u>v</u> 7	occede a Cocce	000000000000		0000 000	g Plus Proc
	Exhaust		Closes	2247 22547 22547 1047 1047 1047 547 647 647	6AT 6AT 6AT 10AT 10AT 8AT 6AT	10AT 161/2AT 5AT 5AT 10AT 10AT 5AT 5AT 10AT	6AT 5AT 5AT 5AT 10AT	N—No ur None. OP—Gocillating Plunger. P—Pressure. PS—Pressure Stream and Splash. Pu—Purolator Prod. Inc. Pv—Rotive. See—Semi-Steel. Sp—Splash. Sh—Splash.
(Degrees)	EX		sneqO	5588 5588 5588 5288 5288 5288 5688 5688	5088 4888 4888 5588 5088 50.988 4888 50.988	4688 4588 4588 4588 4588 4588 4588 4588	4 4 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	W. S.
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			sneqO	1387 1387 1487 70 70 70 70 387 1287 1287 1287 1287	1287 1287 587 7C 1087 1087 10.487	68T 4½8T 58T 58T 7C 7C 7C 108T 108T	1287 587 587 587 587 1587 1587	Automa
	81	HILITE	Hydraulic Valve	ZZZ>>>>ZZZZZ	ZZZZZZZZ	22222222	ZZZZZZZ	ecl. Hard
		Exhaust	gnimíT	015 0.015 HAA HIAA HIAA 1.013 H 410.014 1.009	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	H 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0122 0122 0200 0200	Ha—Hydromatic or Hydraulic Automatic Adutomatic Adutoment.  Here—Hereules.  HMS—High Manganese Steel.  IRG—Hon Alloy Cyanide Hardened.  KS—King-Seeley Corp.  LB—Link-Belt Co.  Mic—Michiana.  Mor—Morse Chain Co.  MR—Morse Chain or Ramsey Chain Co.
VALVE TAPPET CLEARANCE	sues)	EX	Operating	.015H HAA HAA HAA HAA .013H .010H .010H	010H 0115 012H 012H 014C	44 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Hydromat ustment. Hercules. High Man ron Alloy King-Seelk Link-Belt Michiana. Morse Chi
VALVE		Intake	gnimi <b>T</b>	015 015 015 005 006 009	0.00.00.00.00.00.00.00.00.00.00.00.00.0	H A L O C C C C C C C C C C C C C C C C C C	0.0000000000000000000000000000000000000	Here HMS- KS- Mic- Mair- Mair- MR- MR- MR- MR- MR- MR- MR- MR- MR- MR
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GEA	SPHC		Make	LLB Own Own Own	O MAN D MAN	PER BRAN	00wn 00wn 00wn	tion.
	PASSENGER CAR MAKE AND MODEL		MAKE AND MODEL	Buick Special 40 Super 50 Cadillac Roadmaster 70 Cadillac 61 Chysler FJFK Chrysler C-38 Crosley CC	P. 3 Wheeler D-2 e B-7 e B-7 B-4 B-485-F486 on B-81-482 R K481-K482 r K481-K482 r K481-K482 r K481-K482 r K481-K482 r K91-K482	Ambassador 4860 nobile Dynamic 60-68 Dynamic 70-78 Dynamic 70-78 Dynamic 70-78 Tuturamic 88 -2201, 2213 Super 8-2202, 2233 Cust. 8-2206, 2233	Plymouth P-15 Pontiae 6-26 6-26 6-26 Studebaker 70 15A 15A	ABBREVIATIONS  (a)—Duofo, splash.  AC—AC Spark Plug Div.  AL—Alternoum.  AI—Atter top cerer.  Aul—Atte-Lifee.  BB—Before bottom center.  BF—Bakelite and Fahre Composition.  BT—Before top center.
			Line Number	-26.430 res 51-57	13 Davis 14 De S. 15 Dodg 16 Ford 17 Fraze 20 Huds 22 Linco 23 Merc	256 Oldsn 27 27 28 28 33 Packa 33 Playb	355 Ply 377 338 440 Stu	AREA AND AND AND AND AND AND AND AND AND AN

## FUEL AND COOLING SYSTEMS

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-		Fan Make	Hay Hay Hay Hay Own	Sch Hay	Own Own Own Own Seh	Own Own Own H-S Hay
		Width Max. (Un.)	111111111111111111111111111111111111111	34 34 37 37 37 37 37 650	4125,32 23,32 33,4 113,16 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	%%%%%% 802 802 803 803 803 803 803 803 803 803 803 803
	BELT	Length Outside (In.)	341,32 341,32 341,32 424,32 489,16 3489,16	489/16 4911/16 411.5 411/2 35.4	4113/16 4421/16 4411/16 4411/16 443/8 68.6 53	25 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
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		Make	Var Var Gaa Gaa Gaa Gaa	000000000	Var	Var
	Hose	Length (In.)	TTT===================================	223 223 223 23 50 23 50	73.4 23.4 33.4 33.4 33.4 33.4 33.4 33.4 3	131/2 131/2 131/2 11 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	Upper	(.nl) refemsiQ ebisnl	2.2.2.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	284848 27277 ES	11211111111111111111111111111111111111	%%%%%%%%%%%
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	Lower	(.nl) refemsid ebisnl	1999	2552222222 272222222 2722222222	71. 10 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	S. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.
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-	tor	Маке	Har	VVar MGC MGC Omi	McC Har Har Har Har Z Own	Har Har Har McC
	Radiator	Type	VVC CCE TTF TTF TTF TTF TTF TTF TTF TTF TTF TT	TTC TCTTCC	777777777777777777777777777777777777777	2222222
-	noi	By-pass for Recirculat	V V V V V V V V V V V V V V V V V V V	NO ON O	NO NO NO NO NO NO NO NO NO NO NO NO NO N	Yes No Yes Co Yes Co Yes Co Yes
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-	1	Type Manifold Heat Contro	NA ANNO SON SON SON SON SON SON SON SON SON	Aut	NA AUTHOR	Auto Auto Auto Auto Auto Auto
		Size (In.)		20000000000000000000000000000000000000	22222222222222222222222222222222222222	2000 000 000 000 000 000 000 000 000 00
	Carburetor	Model No.	(a) (b) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	28-AV-10 5GA-9510 5GA-9510 WDO-647S WDO-648S WAI AA-i 59A-9510	WAI-6625 WAI-464S WAI WAI WDO-644S WDO-633S	WAI-537S WAI-537S WCD-630S WCD-630S WE-861S BXOV-26 WO-631S
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	Feed	<u>T</u> ype	35555555555	8888888888888		55555555
		Tank Capacity (Gal.)	119 20 20 20 20 20 20 20 20 81/2	20 20 20 21 21 21 21 21 21 21 21 21 21 21 21 21	200711111111111111111111111111111111111	7777772
		PASSENGER CAR MAKE AND MODEL	Buick Special 40 Super 50 Cadillac Roadmaster 61 62 Chevrolet F1_F4 Chrysler C-38 Crosley C-38	Davis—3 Wheeler D-2 De Soto S-11 Dodge S-17 Dodge D-24 Ford S94 Frazer F485-F486 Hudson 6.481-482 Kaiser K481-482 Lincoln 876H Mercury 88M	Nash. Ambassed v 4860 Oldsmobile. Dynamic 80-88 Dynamic 80-88 Dynamic 80-88 Dynamic 60-88 Dynamic 60-88 Fackard Futuramic 98 6-2201, 2211 Super 8-2202, 2232 Cust, 8-2202, 2232	Plymouth 6-15 Pontiac 6-26 6-26 6-28 8-27 8-27 8-28 Studebaker 15A Willys 663
		Line Number	2 C C C C C C C C C C C C C C C C C C C	13 David 14 De S 15 Dodg 16 Ford 17 Fraze 19 Huds 20 Linco 22 Linco 23 Merc	255 Oke 225 Oke 225 Oke 228 331 Page 333 34 Pla	35 Ply 36 Por 37 38 39 540 Stu

FB—Fan belt.
Fal—Putton or Bishop & Babcock.
Fed—Peeders Mfg. Co.
Full evidence coupling.
Full—Fullon Sylphon Co.
Ga Gares Rubber Co.
Ga Goodyear.
Har—Marchin or Gates Rubber Co.
Har—Marchin Radiator Co.
Hay—Layes Industries AC—AC Spark Plug Div.
Al—Automatice
BB—Bishop & Baboock Mfg. Co.
Ca—Carter Carburetor Co.
Ge—Centrifugal pump.
CP—Centrifugal pump.
CP—Culturer
CP—Cul

Her-Hercules.
Hel-Holley Carburetor Co.
H-S-Hayes or Schweitzer-Cummins.
H-W-Hayes or Walker.
McG-M. Cord Radiator Co.
No-No nr. None Radiator Co.
Old - Oldberg, Mig. Co.
Old - Oldberg, Mig. Co.
Old - Oldberg, Mig. Co.
S-Q-Stromberg or Carter

Sch—Schweitzer-Cummins.
5D—Single downdraft.
5m—Smitty.
5m—Smitty.
7tr—Turbeng Carburetor Co.
7tf—Turbe and Fin.
7tf—Turbular Vec Cell.
1ntt—United Air Cleaner Div.
1ntted Specialities Co.
VG—Vee Cellular.

Var—Various.
Wa—Wayne Industrial.
Wa!—Walker Mfg. Co.
W-M—Walker or Hayes.
Yng—Yong Radiator Co.
Zen—Zenith.

ABBREVIATIONS

— With heater, 18 qts.
— From W. P. to Cyl. Block 176, x 544.

(a)—Stromberg AAV-16, Carter WCD-608S.

(b)—Stromberg AAV-27; Carter WCD-664S.

(c)—Two used—176, x 378, and 176, x 434.

(d)—Stromberg AAV-28; Carter 595S.

(e)—R. H. 1236, ... H. 1236, ... 434.

(h)—Two used—178, x 434, and 134, x 444.

(h)—Two used—178, x 31/2 and 146, x 534.

VC-Vee Cellular,

S-C-Stromberg or Carter

## IGNITION SYSTEMS AND BATTERIES

	Line Number		-4440-000-0	22222222222	333333887884	2268898
		Loission	######################################	333 <u>5</u> 53335 <u>5</u> 5		355555
		Terminal Grounded	P P P P P P P P P P P P P P P P P P P	Possesses Possesses Possesses	PPOS S S S S S S S S S S S S S S S S S S	NNNNN NN
	ch ging	Finish (Amp.)	rrr@@@@r *	447 744	44000	53%
BATTERY	Bench Charging Rate	(.qmA) fraf2	7200007	881 400	00000 666666	53%
BA		Plates per Cell	2577777757885	7277277277	2722222222	22522255
		Capacity - Amp. Hrs. at 20 hr. Rate	100 1120 1120 1135 1135 1135	1200001	90 1100 1100 1100 1100 1100 1100 1100 1	260000000000000000000000000000000000000
		Make	WWY-A	Cont W-A W-A Nar Nat Nat AL AL Var Var	A K K K B B B B B B B B B B B B B B B B	W.A.
		Ignition Cable Make	OEx Dak	2242242	00000	AWA Pak AWA
		Gap (In.)	025 025 030 030 030 030 040 025 025 025	.025 .025 .032 .038 .038 .038		.025 .025 .025 .025 .025 .025
PLUGS		Thread Size	444000004444	444444444	4444440008 	2224244
SPARK		laboM	48 48 48 104 104 104 M8 A7	52059 H10 H10 A5-B J-9 H-10 A5-B H-9	-\$444446 <u>9</u> 9	45 45 45 1-7 AT-F
S		Make	A PAPAPA	£ 55455455	<b>666888888</b>	PUCABOO
7	arage aw	Engine Idling	03333333333333	35.25.33.33.33.33.33.33.33.33.33.33.33.33.33	22,22,22,22,23,24,4,4,4,4,4,4,4,4,4,4,4,	2.3
COIL	Amperage	Engine Stopped	444444440000 00000	3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5	44444600 666666666666666666666666666666	0. 2.4
	Timing	Firing Order	1.65.2 1.65.2	12.4.3 15.3.6.2.4 15.3.6.2.4 15.3.6.2.4 15.3.6.2.4 15.3.6.2.4 16.3.6.2.3.7.4 16.3.8.2.3.7.4 14.3.8.8.2.2.11,10.3.6.7.1	1.55.33 1.55.33 1.55.33 1.55.34 1.55.25 1.55.25 1.55.25 1.55.25 1.55.25 1.35.2	15.3.6.2.4 15.3.6.2.4 15.3.6.2.4 15.3.8.3.7.4 15.3.8.8.3.7.4 15.3.6.2.4 15.3.6.2.4
		Marks On	\$5599995999£	NN SELECTION OF THE SECOND OF	335555	255559
		Spark Occurs (Deg.)	48T 48T 63T 58T 58T 58T 2AT 2AT 2AT 2AT	2AT 2AT 18T 48T 1C 7C 7C 2BT 48T	70 70 70 70 70 70 70 70 70 70 70 83 70 83 70 83 70 83 70 83 70 83 70 83 70 83 70 83 70 83 70 84 84 84 84 84 84 84 84 84 84 84 84 84	48T 48T 48T 48T 28T 28T
		Cam Angle (Deg)	822883333333 8	36 38 38 36 36 36 36 36	35 31 31 27 27	37 37 38 38 38 38
z	inter	(.sO) noisn9T m1A	19-23 19-23 19-23 19-23 17-21 17-20 17-20 17-20	17-20 17-20 20-24 20-24 17-20 17-20 17-20 20-24 20-24	17-20 17-21 19-23 19-23 19-23 19-23	17-20 17-21 17-21 19-23 17-20 17-20
GNITIO	Breaker	Gap (In.)	020 020 020 020 020 020 020 020 020 020	020 020 015 015 020 020 020 015	020 020 020 020 020 020 020 015 015 015	020
2	-9	Max. Vacuum Advanc Crankshaff (Deg.)	10-12 10-12 18 18 18 18 16 20 14 18	10-14 15-15 15-15 17 17 17	222222	18-22 2812 2812 20 20 18 12
		Inches Mercury Required for Vacuum Advance (± 1 in.)	6.50 6.50 7.00 No	8.00 8.00 14 8.00	8.50 8.50 7.50 7.50 7.50	8.8.8.00 8.00 9.00 9.00 9.00 9.00
		Max. Automatic (Deg.) at Mrst Engine H.H.	26-3000 26-3000 26-3000 24-4000 24-4000 24-4000 39.5-3450 26-3000 26-3000 24-2000	24-2800 22-2250 119-3400 20-3400 24-4000 25-3400 25-3400 26-3400 26-3400 26-3400	21-2800 24-22-4000 22-3600 22-3600 22-3600 22-3600 22-3600	20-2600 28.5-40† 28.5-40† 28.40† 28-40† 14-2800 22-1400
		Model	1110801 1110801 1110801 1110080	59A 59A 59A CE6006 CE6006 16H 59A	IGC-9289 IGS-42058 1110214 1110214 1110208 1110808 (a) (a) (GDZ-4801G	647D 647D 1110804 1110804 1GC-4805 IGC-4802
		Маке	AL 008	Own Own	APSS BRARA	AA
		PASSENGER CAR MAKE AND MODEL	Butek Special 40 Super 50 Cadillac Roadmaster 70 62 Chevrolet FJ-FK Chrysler C-39 Crosley C-40	Davis—3 Wheeler D-2 De Soto S-11 Dodge D-24 Ford B77H Frazer F485-F486 Hudson B, 483-484 Kaiser K481-K485 Kaiser K481-K485 Meruny 8978H Meruny 8978H	Nash Ambassador 4860 Oldsmobile Dynamic 60-88 Dynamic 70-78 Dynamic 70-78 Dynamic 170-78 Packard 8-2202 2232 Cust. 8-2202 2232 Playboy A-84	Plymouth P-15 Portiae 6-25 8-26 8-27 8-28 Studetakar 15A Willys 663
		Line Number	-40400V805E2	22289876543 NA TT TUBE	3333300 C S S S S S S S S S S S S S S S S S S	\$338.33 \$4.03 \$3.05 \$4.03 \$3.05 \$4.05 \$6.05 \$4.05 \$6.05 \$4.05 \$6.05 \$4.05 \$4.05 \$6 \$4.05 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6

ABBREVIATIONS

AC—Ac Spark Flug Div.
AL—Ti-Le Electric Auto-Lite Co.
AT—After Top Center.
AW—American Enamel Mag. Wire Co.
BT—Before Top Center.
CH—Champion Spark Flug Co.
OH—Continental
OR—Deloc-Remy Div. (a)—Auto-Lite (GD2-4801F or Delco 110699.
 (b)—AC-104, Champ. Y4R or Auto-Lite P-4.
 ←At 40 Miles per Hour.
 ←—Medis 2211 and 2232 have cam angle of 31 or 222 have cam angle of 31 or 223 have cam angle of 31 or 323 have cam angle or 323 have cam angl

EX—Essex Wire Corp.

Fly—Rivatoral Battery Co.
Nat—National Battery Co.
Nog—Negative.
No—No or None.
OEx—Essex Wire Corp. Material Crosley Fabripak—Pakand Electric Co.

Pos-Positive.
TG-Right side under front fender.
TC-Top-Center.
UF-Under front seat.
UH-Under hood.
UH-Under rear hood.
UL-Under near hood.

VD—Vibration Damper.
W-A—Willand Storage Battery Co. or The Elec-tric Auto-Lite Co.
Willard Storage Battery Co.

## STARTING MOTORS, LAMPS AND HORNS

	,	Line Numbers	-0044007880=5	2222222222	33323333333333333333333333333333333333	33 37 33 38 39 41 41
	ų	Amperage Draw of Eac	19, 21 19, 21 19, 21 19, 21 35, 40 35, 40	35 40 15 40 15 15 15 15 15 15 15 15 15 15 15 15 15 1	14-16 18-20	35-40 18-21 18-21 18-21 12-15 12-15
HORN		Make	Spare DON Spare	Spar S-W S-W S-W	**************************************	DRS DRS DRS
_		Number Used	~~~~	~~~~~~~~	0000000	~~~~~~
		€ Appe	*********	222222222		9999999
		Tail and Stop Light-	8-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5	Own Hall Hall Own	C-B Guide Guide Guide Own	Conide Conide Conide Conide Conide Conide
20	-14	Parking or Fender Lig		Own Hall AL Hall Own	CC-B Guide Guide Guide Own	Guide Guide Caude C-B
LAMPS		Незд Гзшр—Маке	Genide Genide Genide Genide Genide Genide Genide	Own Own Hall Hall Own	Hall Guide Guide Guide	Guide Guide C-B
		Tail and Dash Lights in Series	ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	NN	NANNAN N	O O O O O O O
	ų	Make—Lighting Switc	0 0000 00 88 8888888	Rbm PPH JPH Sbm	C 000000	00000 000000 000000
		1911stS of oitsA (f-of) enutsm1A	16.22 17.33 17.00 17.00 17.00 17.00 17.00 16.22 16.22 16.22	11.20 11.20 11.20 11.20 11.20	13.50 10.40 16.11 16.11 16.11 16.11 16.55 15.55 15.55 9.60	6.22 5.55 5.55 5.55 5.55 5.77 5.77 5.78 5.78
	Flywheel	Face Width of Teeth	25 8 4 4 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	24.48. 13. 24. 46. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	Sanaaa a	"adadada :
		Mo. of Teeth	146 156 156 156 156 146 146 146 146 146	146 132 133 134 172 172	122 145 145 146 140 140 140	146 140 140 140 124 133
		sedeeM noiniq	14 14 14 14 14 14 14 14 14 16 16 16 16 16 16 16 16 16 16 16 16 16		******	
		Starting Operation	Pod d d d d d d d d d d d d d d d d d d	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	Pbd Dsp Dsp Dsp Pbd Pbd	Poc c c c c c c c c c c c c c c c c c c
	Starting Device		Sol	88888888888888888888888888888888888888	Man Man Man Man Sol Sol	Man Man Sol
	Type of Drive		000000000000000000000000000000000000000	Sgo Hen Ben Ben Ben Ben Ben Ben	S S S S S S S S S S S S S S S S S S S	Ben Ben Ben Ben
STANTING MOTOR	Test	.m.9.я	5500 5500 5500 5500 5500 5500 5500 550	3800 6500 6500 6500 6500 6500 6500	5000 5000 6000 6000 6000 4300	3250 5000 5000 6000 6000 4300 4900
200	No Load Test	MiloV		00000000000000000000000000000000000000	00000 99	0.0000000
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		Torque (Lb. Ft.)	12.0 16.0 16.0 16.0 17.0 15.0 15.0 4.4	15.0 15.0 175.0 175.0 175.0 175.0 175.0	222.5 172.0 172.0 175.0 175.0 175.0 175.0	9.5 172.0 15.0 15.0 18.0
	Lock Test	viloV	64.400000000000000000000000000000000000	3.40 3.25 3.25 3.25 3.25 3.25 3.25 3.25	3.00 3.00 3.00 4.00 4.00	3.80 3.00 4.00 4.00 4.00
	-	Average Draw	575 575 600 600 600 600 600 600 525 580 580 580	525 525 550 670 880 880 880 550	775 475 475 600 600 600 600 600	450 525 525 600 600 670
		noisneT gning Tension (.sO)	24-28 24-28 24-28 24-28 24-28 24-28 24-28	27 27 42–53 53 63 62 27 27	42-53 24-28 24-28 24-28 24-28 42-53 42-53	42-53 24-28 24-28 24-28 42-53 42-53
	(.M	Çranking Speed (R.P.	90 90 90 250 250	000 000	88888	43 49 49 130 130
		Model	1107048 110728 110728 1107331 1107331 1107931 1107061	62113-8 18-1101 16-11001 MCL6006 MCL6006 18-11001	M.Z4103 I.107068 1107068 1107941 1107941 1107931 (a) (a) MAX-4052 MAX-4052	1107032 1107032 1107921 MZ-4136 MAW-4020A MZ
		Make	DB	AL Own	AR®®BBBBB	DBR DBR AL
		PASSENGER CAR MAKE AND MODEL	Autok. Special 40 Super 50 Sadillac. Roadmaster 70 Second 50 Secon	s - 3 Wheeler D-2 e D-24 e D-24 B-36 on 6, 81-482 on 6, 81-482 R K481-482 R K481-482 in K481-482 in K481-482 in K481-482 in K81-482	Ambassador 4860 bile Dynamic 70-76 Dynamic 70-76 Dynamic 70-78 Dynamic 70-78 Luturamie 98 -2201, 2211 Super 8-2202, 2233 Cust. 8-2206, 2233	Plymouth. P-15 Pontiac. 6-25 6-26 8-27 8-27 Studebaker. 7G Willys. 663
PASSENGER C MAKE AND MODEL				13 Davis—3 Wheeler 14 De Soto. 15 Dodge 16 Ford. 17 Frazer 18 Hudson. 20 Hudson. 21 Kaiser 22 Lincoln. 23 Mercury.	24 Nash Amba 25 Oldsmobile Dyn 27 Dyn 28 Dyn 30 Packard R B 31 Packard B	Playboy.

ABBREVIATIONS

(a)—Bendix type.
(b)—Auto-Lite MCI-6003 or Delco-from 1107943.

AL—The Electric Auto-Lite Co.
Ben—Bendix-Eclipse Machine Div C-8—Corcoran-Brown Lamp Div.

F-Front.

Guide-Cuide Lamp Div.
Hall—C. M. Hall Lamp Co.
PH—Jos. Follach and Cole-Hersee.
Man—Manual.
Pede—Push button on dash.
R—Rear.

Rbm—R. B. M. Mfg. Co.
Sgo-Siding gear with overrunning
Sol-Solenoid.
Solar-Sparton.
S.W.-Sparton.
S.W.-Sparkov. Withington Co.
Vib.-Vibrator.

## GENERATORS AND CLUTCHES 1948 PASSENGER CARS

		Line Number	-0040000000	22 22 23 23 23 23 23 23 23 23 23 23 23 2	333333333333333333333333333333333333333	44 44 44 44 44 44 44 44 44 44 44 44 44
The same of		No. Required	~~~~~~~~ <del>~</del>	2222222222	~~~~~~~~	~~~~
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		Semi-Centrifugal	No N	Yes Yes Yes Yes	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	No.
		Prive Type	######################################	5025555555	*********	*******
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	lator	Average Air Gap (.nl)	.085 .085 .082 .082 .082 .082	045 045 045 045 045	050000000000000000000000000000000000000	082
	Current Regulator	Temperature (°F)	150 150 150 150 150 0pr	88 <u>4</u> <u>1</u> 88	000000000000000000000000000000000000000	111122
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	itor	RAD TIA BETEVA (.nl)	.070 .070 .070 .070 .070 .070	045 050 045 045 045	050	.050 .072 .072 .050
	Voltage Regulator	Temperature (°F)	150 150 150 150 0pr 70	2222222	222222222222222222222222222222222222222	221100
	Voltage	stioV	7.4 7.4 7.4 6.9-7.0 6.9-7.0 7.2-7.4 7.35	7.1-7.5	7.2-7.4	7.2-7.4 7.2-7.4 7.2-7.4 7.35
		Average Air Gap (in:)	020 020 020 020 020 020 020 020 020 020	010	.032 .020 .020 .020 .020 .032 .032	.020 .020 .020 .036
OR	Cutout Relay	Amperes to Open Reverse Current	2222 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	2 000004440 0 0000	2000044 3444439
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		Маке	A 0000000	: 55 55	AAL	4 A B B B B B B B B B B B B B B B B B B
		PASSENGER CAR MAKE AND MODEL	Buick Special 40 Super 50 Cadillac Roadmaster 70 Cadillac 61 61 Chevrolet FLFK Chrysler C-38 Croalov CC-10	3 Wheeler D-24 B-11 D-24 87HA 87HA 81-485 6, 481-486 6, 481-486 8, 483-484 K481-488 8, 483-484 81-488 8, 483-484 8, 483-484 81-488 8, 483-484 8, 483-484 8	600-4840 Ambassador 4840 Joynamic 60-66 Dynamic 60-86 Dynamic 60-88 Dynamic 70-78 Futuramic 98 8-2201, 2231 Cust. 8-2206, 2233	th P-15 6-26 6-26 6-26 8-27 Ker 7G

TB—Third brush type.
V—Voltage regulator.
Wo—Woven asbestos.

AC—Ac Spark Plug Co.

AL—The Electric Auto-Lite Co.

AL—The Electric Auto-Lite Co.

Co—Cork.

CV—Current and Voltage Regulator.

Df—Direct to flywheel face.

Df—Drect to flywheel face.

FD—Fluid drive.

H.C—Hot or Cold.

III—Indicating light.

III—Indicating light.

III—Indicating light.

KS—King-Seely Corp.

Long—Long Mig. Div.

Max—Maximum.

MAM—Moulded Metallic.

Mo—Moulded asbestos.

NW—Moulded house fasce, wovrn on other face.

NW—Moulded wore fasce, wovrn on other face.

NO—No or None.

Opr—Operating temperature.

Som—Springs.

Som—Shrings.

Som—Stewart-Warner Corp.

# TRANSMISSIONS AND UNIVERSAL JOINTS

		S	Line Number		22 28 98 77 50 DB 22 28 BB 77 50 DB 23 DB 23 DB 24 DB 25 DB	25 Na 26 Oil Na 33 33 Phi	337 Pp. 238 Pp. 338 Pp. 338 Pp. 338 Pp. 340 St. 440 William William Pp. 340 Pp	ABBRE.	
		PASSENGER CAR MAKE AND MODEL	Make	Buick Special 40 Own Cadillac Roadmaster 70 Own Cadillac B Own 605 Own Chevolet FLFK Own Chrysler C-38 Crosley CC WG	Davis—3 Wheeler D-2 WG De Soto S-11 Dodge B-7HA Own Frazer F485-F486 WG Hudson 8, 481-482 Own Kaiser K481-K482 WG Lincoln 891M Own Mercury 891M Own	Nash	Plymouth P-15 Own Pontiac 6-25 Own 8-27 Own 8-27 Own Studebaker 7G WG 15A WG Willye 863 WG	ABBREVIATIONS  "-At extra cost.  "-Yacuum assist.  -To conform with Army Spec. No 2-1086 (All purpose lubricant).  And—Automatic.  BT—Ball and trumnon with roller  BW—Borg-Warner.	
	S*andai	Syandard IsboM		wn wn wn wn wn wn wn wn	G ASI-T96	n n n n n n n n n n n n n n n n n n n	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Ö.	
LAN	p			11111111111	g ::::::::::::::::::::::::::::::::::::		<b>&gt;&gt;&gt;&gt;&gt;</b>		
TRANSMISSION		96	Shift Make and T)	V V O O O O O O O O O O O O O O O O O O	No Own	N OOOOOO	NOO-O-O-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N-N	CL—Chassis CT—Cross t E—Vac-El G—Grease HI Helical Myd—Hydrav Me—Miners Me—Merval	
-	Optional			No Aut	No N	M Aut Aut No	Aut Aut No	CL—Chassis lubricant. CT—Cross type with roller bearing. E—Yac-Electric, vacuum GG—Grassis Helical. Hi-Helical. M—Mineral base oil. M—Mineral base oil. MMo—Meaning Juiversal Joint Div.	
	-		nide				MAK NN	ant. ch roller racuum nil. iversal J	
		,	Make		WG NO	WWG 2 2 NN	NO N	bearing oint Div	
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GE			Rear Axle	A.45 N 4.45 N 3.77 N 4.27 N 4.27 N 4.21 N 3.59 N 7.5 N 8.5 N 13.5 N N N 13.5 N N N N N N N N N N N N N N N N N N N	3.70 N. 3.390 N. 3.390 N. 3.390 N. 3.78 N. 3.73 N. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.	4.10 .700 4.30 No 4.55 No 4.55 No 4.55 No 4.55 No 7.50 .76 3.30 .76 3.30 .76	3.90 N 4.30 N 4.30 N 4.30 N 4.09 .77	Mia—Metal with anti-friction be Nb—Needle bearing. O-Dyn—Own-Dyna flow Trans., fun conduction on the North State of North Stat	
GEAR RATIOS-STD	1		evinbrevO	22222222222 00000000000000000000000000	700 NN NN NN 770 770 NN NN NN NN NN NN NN NN NN NN NN NN NN	60 0	No 2.67 No 2.67 No 2.67 No 2.67 No 2.67 .700 2.60	h anti-f aring. he. flow 7 dra-Ma ent lubr earing t	
TIOS	Transmission		MOT	2.2.3.3 2.2.3.3 2.2.3.3 2.2.3.3 3.5.7 3.5.7 3.2.5 3.2.9 3.0.0 3.0 3	2.60 2.557 1.02.557 1.02.557 1.02.557 1.02.557 1.02.557 1.02.557 1.02.557 1.03.557 1	2.57 2.266 2.266 1.22.66 1.22.43 1.153 2.26 1.153 2.26 1.153		Friction Frans., tric. ication. ype.	
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			Вечегае	3.02 3.02 2.53 2.23 7 2.23 7 2.23 7 2.23 7 7 2.23 7 8 2.23 8 7 8 7 8 8 7 8 8 8 8 8 8 8 8 8 8 8 8	3.35 3.48 7.400 7.000 7.000 7.000 7.000 7.000 7.000 7.000 7.000 7.000 7.000 7.	3.48 3.00 3.00 7.3.00 7.3.00 7.3.00 7.3.10 7.3.16 7	28832224 54444	m 1	
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LUB	G	Capacity (Pts.)		22,34 44 44 90 44 49 90 13,24 90 13,24 90 13,24 90 13,24 90 13,24 90 13,24 90 14,24 90 15,24 90 16,24	98668888	2 90 90 90 90 90 90 90 90 90 90 90 90 90	80EP 80EP 80EP 80EP 2 5 90	sar Div. chassis lu- ar Div.	
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JOINTS			Type		:			—Spicer Mfg. Co. Transmission lubricant. Transmission lubricant are a programment of a prog	
			W betssirduJ	+++88888888	55255255	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	SFL Spr	dius rod	
		u	Drive Mediu		Spr Spr TT	SSAA SSAA SPAGE	\$8888888	90	
			Torque Medi	25 25 25 25 25 25 25 25 25 25 25 25 25 2	222222222222222222222222222222222222222	25 25 25 25 25 25 25 25 25 25 25 25 25 2	38 33 33 34 4 4 4 4 5 4 4 4 4 4 4 4 4 4 4		
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SALO BACCENICED CABC

## STEERING AND BRAKES

		Line Mumber		13 14 17 17 18 20 20 22 22	33333333333333333333333333333333333333	44488388	I
		Clearance (In.)	0.17	010	N 900000	210	
		Thickness (In.)	3332	18 8 8	200000000 Nonenana	28,32	
Se	Lining	Width (In.)	2.5	2.0 2.0	N-1-12 2-1-1-2 0 2-1-1-3 2-1-1-3 2-1-1-1-3 2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		Div.
Hand Brakes	3	Length per Drum (In.)	20 20 20 20 15%	153/4 153/4 20.9 20.9	2215;16 2215;16 2217,2 241,2 241,2 241,2 241,2 241,2	1611/16	Sag — Saginaw Steering Gear Divy SC—Self Centering. Tra—Transverse. WE—Wagner Electric Corp. WG—Worm and gear sector. WG—Worm and Roller. Y—Yes.
Har		Drum Diameter	0110	99 ===	%22221111	0	Steering.
		Internal or External	EXTENTED	ZZEEEEEE	EEEEEEEEE22	ZEEEEEE:	inaw inaw inaw inawer inaw inawer inawer inawer inam an inam inam inam inam inam inam i
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		Per Cent Braking on Rear Wheels	60.00 60.00 60.00 60.00 60.00 60.00 60.00	66.0 44.0 44.0 44.0	44.0 44.0 44.0 44.0 44.0 43.5	44.0 44.0 43.0 43.0	90E>>>>
		Total Foot Braking Area (Sq. In.)	161.5 207.5 208.0 208.0 208.0 223.0 173.5 189.2 58.0	173.5 173.5 162.0 162.0 175.7 175.7 175.7	182.0 175.0 175.0 175.0 171.1 171.5	158.0 159.0 159.0 159.0 178.0	
	Clearance	100 H	20.010.010.010.010.010.010.010.010.010.0	900.000.000	00000000	900	missi2n
	Clear	901	20000000000000000000000000000000000000	900.000.000.000.000.000	0.0000000000000000000000000000000000000	900	Co.
(0)		Thickness (In.)	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	23.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2	9999999999	1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	ner Mfg nd Too i, rear cakes.
RAKE	Lining	(.nl) AtbiW	134 134 134 134 134 137	0025 000 00 00 00 00 00 00 00 00 00 00 00 0	*5~8888****	~20000ax <sup>2</sup>	nical. Disc. sd. None. d-Gemn Gear a
FOOT BRAKES		Length per Wheel (In.)	231/16 224/22/23/16 225/22/23/26 (9) (9) (9) (9) (9) (9) (9) (9) (9) (9)	(9) (9) 23.2 22.0 22.7 20.7 20.7 25.8 25.8	2313/64 171/2 222 215/16 215/16 215/16 2215/16 2215/16 241/2 18	2285/6 215/16 215/16 215/16 18/12 18/12 19/12	M—Mechanical. MI—Milan Disc. No—Moulded. No—Nogative NO—No or None. P-G—Packard-Gemmer Mfg. Co. Ross—Ross Gear and Tool Co. PS—Propeller Shaft, rear of transmission. RS—Rear service brakes.
	9	Diameter	2222221212229	=======================================	92222226	255565	NO NO SEE SEE SEE SEE SEE SEE SEE SEE SEE SE
	Drums	IsireteM	Con	2222222	55555555555555555555555555555555555555	G G G S S S S S S S S S S S S S S S S S	
	e de la composition della comp	Secondary Shoe		2222222	00000000 : EXERRES	ZZZZZZZ	
	Type	Primary Shoe	ZZZZZZZZZZZZ	ZZZZZZZZ	Z ZZZZZZZ	222222	
	Type		IIIIIIIII	IIIIIII	IIIIIIIIII	IIIIIIII	
		Маке	BBen Ben CC-L CC-L Maw	Men Ben Ben Ben Ben Ben Ben Ben Ben Ben B	Ben Var Var Var Var Var Var Var	WE Ben	khead.
	(.ge <b>Q</b>	Kinggin Inclination (	44/4 41/4 41/4 41/4 5 551 ato 5 551 ato 5 551 ato 43/4 to 6 61/2 to 6	No 43% to 6° 43% to 6° 88° 51% to 6° 33.36 51% to 6° 51% to 6°	8°° 50° 4°51′10′ 4°51′10′ 4°51′10′ 5°50′ 5°50′ 5°50′	65.00 00 00 00 00 00 00 00 00 00 00 00 00	CL—Cam and Lever. C-L—Chrysler and Lockhead Com—Composite. D—Duo Automatic. Ext—External contracting. Gm—Gemmer Mig. Co. HAW—Haydraulic. Int—Internal expanding. Lg—Longitudinal.
		(.nl) ni-aoT	1,16 to 1,16 t	No 0 to 1/16 0 to 1/16 0 to 1/16 0 to 1/16 1/32±1/32 0 to 1/16 0 to 1/16	1.00 to 1.00 t	0 to 1/16 0 to 1/16 0 to 1/16 0 to 1/16 0 to 1/16 1/16 to 1/18	CL Can Collection Coll
		Camber (Deg.)	7.8 P to N 5/8 P to N	No 10 to + 34 10	1, 10 10 10 10 10 10 10 10 10 10 10 10 10	00 to +3% 00 00 00 00 00 1,20 ± 1,40 1,20 ± 1,40	ė
STEERING		Caster (Deg.)	1, to 1, 1, 2, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	4° -1° to +1° -1° to +1° -1° to +1° -1° to 9° -1° to 10° -1° to 11° -1° to 11	77% 10 3% 13% 10 10 3% 10 10 10 10 10 10 10 10 10 10 10 10 10	0° to +1° 1,2° to 11° 1,2° to 11° 1,2° to 11° 1,1,2° to 11° 1,1,2° to 11° 2° to 11° 2° to 11° 2° to 11° 1,1,2° to 11° 1,2° to	(k)—Front 2¼ in., Rear 2 in. (n)—Front 21 in., Rear 18½ in. (n)—Front 21 in., Rear 18½ in. (r)—Froyvard Shoe 2 in., Reverse 1¾ in. (s)—Frimary 2¼ in., secondary 2 in. Bu—Bendix Produce Div. Bu—Ball bearing, worm and nut. Cen—Cartines. Cl—Cast Iron and Steel.
ST	1	Car Turning Radius Right (Ft.)	20.1 20.9 22.8 22.8 22.8 23.6 28.5 20.5	6.50 20.5 20.5 21.2 21.2 22.0 22.0 22.0	82828228888	19.3 20.0 20.0 21.7 20.7 35.0	Rear Rear e 2 in., see lin., see loo. acts Di worm d Steel
	-	mnA etsibemnetnl	ZZZZZZZZZZZ	ZZZZZ>>>Z	Z>>ZZZZZ Z	2>>>>>	21 in. rd Sh. rd Sh. or D. Prod. aring. use. on an
		shof aiT to .oM	~~~~~~~~~~~	Z000000-		ผผผผผพต	ront ront orwar rimar rimar rimar endix endix all be entrif ast Ir ast Ir
		Drag Link—Type	No Tra Tra No No No	No No Tra Tra Tra	T	Lg Caragas	SEC. 88 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
		(f of) oitsA	2013 2013 2013 2013 2013 2014 2014 2014 2014 2014 2014 2014 2014	22222222 0.2121212222 0.212121222	26220000022222222222222222222222222222	18.2 19.0 19.0 12.0 12.0	
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TRUCK SPECIFICATIONS TABLE OF CURRENT PRODUCTION MODELS



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CURRENT TRUCK

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DATA SUPPLIED BY MANUFACTURERS AND TABULATED BY

## **AUTOMOTIVE INDUSTRIES**

## Key to Definitions, References and Abbreviations

## DEFINITIONS

MAKE AND MODEL Only Domestic Truck Models are listed.

## OPTIONAL UNITS

For the express purpose of best fitting the truck to the individual job most of the models listed can be provided with optional engines, transmissions, axies, etc., and these models when so equipped are considered standard stock models.

## CHASSIS LIST PRICE

The chassis list price applies to the minimum standard wheelbase with standard tires and standard equipment. All prices are F.O.B. factory. Chassis list price does not include the price of the Cab unless otherwise noted.

## RECOMMENDED GROSS VEHICLE WEIGHT FOR NORMAL SERVICE

The Gross Weights published herewith are those supplied by manufacturers as their Recommended Gross Vehicle Weights for Normal Operating Conditions, and are based upon the Maximum Authorized Tire Size listed. In actual practice the manufacturer may either increase or decrease the gross vehicle weight rating when either favorable or

unfavorable operating conditions are involved. Since the proper performance of a motor truck depends upon many factors, including grades, road condifactors, including grades, road condi-tions, etc., the gross weights that a manu-facturer is prepared to recommend will vary with particular conditions, and the manufacturer's own standard of safety factors. Specific recommendations, therefore, should be obtained from the manufacturer's representative.

The chassis weight listed includes the The chassis weight listed includes the weight of the minimum standard wheelbase chassis, with cowl, with standard tires, with standard equipment, with crankcase and cooling system full, and 5 gallons of fuel in the tank. It does not include the weight of the Cab. This applies to C.O.E. as well as conventional chassis types. Exceptions are noted.

## STANDARD TIRE SIZE

he standard tire size listed is that which included in the Chassis List Price.

## MAXIMUM AUTHORIZED TIRE SIZE

The tire size listed in this column ≡ the maximum size recommended by the manufacturer of the chassis for the Gross Vehicie Weight for Normal Operating Conditions. It is furnished at extra cost, if it differs from the standard size. Dual rears are understood; exceptions noted.

## MINIMUM STANDARD WHEELBASE

The minimum standard wheelbase is the -called standard wheelbase on which the Chassis List Price is based.

## MAXIMUM STANDARD WHEELBASE

The maximum standard wheelbase is the extreme end of the standard range of wheelbases offered by the chassis maker.

## MAXIMUM BRAKE HP.

Maximum Brake Horsepower at Given R.P.M. is actual dynamometer reading without accessories.

## GEAR RATIO RANGE

Gear Ratio Range in High—Ratios within the range given are available at no extra cost. Exceptions are noted.

## TRACTORS

Unless given the designation (N)—meaning not available as a tractor—all standard models may be assumed to be available as tractors. Exclusively Tractor models are designated (T).

## KEY TO REFERENCES

c.f.-Cab Forward design. c.o.e. - Cab-Over-Engine design. (D) — Diesel-engine equipped.(T) — Designed for tractor use only.

(C)—Converted Ford or Chevrolet Model.

(2) International Harvester—Specifications shown represent only the basic standard chassis units and standard chassis ratings in keeping with definitions established by Commercial Car Journal. Optional units not shown such Journal. Optional units not shown such as engines, clutches, transmissions, axies or axie ratios, brakes, wheels and tires, frames or frame reinforcements, optional wheelbases or any other units which make up part of the truck classis and which International will furnish and which international will furnish and approve from the factory as optional equipment can or will change either the ratings, chassis weight shown or per-formance of the truck as indicated by this list.

Also the company reserves the privileges Also the company reserves the privileges of assigning special gross vehicle ratings for any chassis providing in the opinion of its engineering department, the type of service justifies the new rating without decreasing the safety factor designed into the truck.

(a) -Available with Two-Speed Axie designated KBS Models.

## -KEY TO ABBREVIATIONS -

## MAKES-ALL

MAKES—ALL

B—Bendix
BL—Brown-Lipe,
Bu or Bud—Buda.
BW—Bendix-Westinghouse
C—Chevrolet.
Clor Cla—Clark.
Con—Continental.
Cum—Cummins-Diesel.
Bat—Eaton.
F—Ford.
Fu—Fuller.
H—Hotchkiss.
Her—Herculies.
L—Lockheed.
LH—Lockheed front, Wagner "hi-Tork" rear.
LW—Lockheed front, Wisconsin rear.
M—Midland.
N.P.—New Process.
O or Ow—Own.
Op or Opt—Optional,
Spiu—Spicer
T or Tim—Timken. Op or Opt—
Shu—Shuler.
Spi—Spicer
T or Tim—Timken.
Tw—Timken-Westinghouse
TW—Timken-Wisconsin.
WQ—Warner Gear.
Wau—Waukesha.
Wor Wis—Wisconsin.
Ws—Westinghouse.
WW—Westinghouse or Wagner

## WHEELS DRIVEN

2F—Forward unit of Rear Axle Group.
2R—Rear Unit of Rear Axle Group.
4R—Forward and rear units of Rear Axle Group.
6—All wheels.

## BRAKES-SERVICE

## Location

4-Four Wheels, front and rear.

4r-Four Wheels, rear only.

## Type

I-Internal.

## Operation

—Air. —Hydraulic. —Vacuu D or Dp—Dual Primary

## RRAKES-HAND

## Location

-Center of double propeller shaft, Rear wheels. Four wheels. -Six wheels. -Back of Power Divider. -Jackshaft. -Transmission. -Driveshaft.

## Type

D—Tru-Stop disk.

I—Inpernal.

M—Mechanical.

X—External.

PD—Two drums on rear of power divider.

## BRAKE DRUMS

## Material

A—Cast alloy Iron.
A—American Car Foundry.
c—Cast Iron.
Cc—Composite Front, Cast Iron in rear. C—Cast Iron.
Cc—Composite I
Cl—Copper Iron
Co—Composite.
D—Dayton.
E—Ermalite.

—Gunite, —Nickel iron, —Steel.

(Where a combination of any of the above is used, the first reference mark applies to the front and the second to the rear drums.)

## FRAME

## Type

C—Channel.
T—Channel apered front and rear.
L—Channel reinforced with liner.
B—Channel reinforced with both liner and fishplate.
P—Channel reinforced with plate.
TL—Channel tapered front and rear reinforced with liner.
D—Drop Center
Tf—Tapered front.
A—Straight section sidemembers, lined with oak inserts.
Z—Reinforced (X) member frame, box type sections.

## REAR AXLE

## **Final Drive and Type**

B—Bevel. CD—Chain Drive CD—Chain Drive
F—Full-floating.
H or Hy—Hypoid.
d—Dual range axie.
2—Double Reduction.
S—Spiral bevel.
W—Worm.
4—Three Quarters Floating.
2—Semi-Floating
T—Torque Tube

## GEAR RATIOS

(\*\*) Only one ratio.

## **Drive and Torque**

-Hotchkiss (springs). -Radius Rods. -Parallel Torque Rods -Torque Arm.

## GOVERNOR STANDARD

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		Make and	Wau 6BM   Wau
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## CURRENT TRUCK SPECIFICATIONS—(Continued)

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SIZES	dual rear	Maximum Authorized Tire Size (Duals un-	9.00/20-10/	0.0	0.01	0-01/00-0		1.00/22	80000	8.25/188	**************************************	6.50/168
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# CURRENT TRUCK SPECIFICATIONS—(Concluded)

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		MAKE AND MODEL	KB-6F 4R KB-8F 4R KB-1F 4R W-11F 4R W-4564OH	Kenworth 522 (D) 523 4R (D) 524 4R (D) 524 4R (D) 552 4R (D) 552 4R (D) 652 4R	(C) CM5-6 (C) CM6-6 (C) MH440-6 MH-555-6	Oshkosh W703-6X6 (D) W1600BD (D) \$W1600BDH (D) \$W1600BDH (D) W1600CD (D) W1600CDS (D) \$W1600CDS (D) \$W1600CDS (D) \$W1600CDS (D) \$W1600CDS	Peterbilt (D) 344DT (D) 345DT (D) 345DT (D) 354DT (D) 355DT		Tuckstell
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	BUS MAKE AND MODEL	Passenger Rating	Type (City Service, Parlor, etc.)	Standard Wheelbase (In.)	Overall Length (In.)— Bumper to Bumper	Inside Length (In.)— Passenger Compartment	Tread (In.)— Front and Rear	Complete Vehicle Weight-Dry (Lb.)	Standard Tire Size (In.)— Front and Rear	Make and Model	Cycle and Fuel	Location	Number of Cylinders— Bore and Stroke (In.)	Displacement (Cu. In.)	Rated Horsepower (A.M.A.)	Maximum Brake Hp. at Governed R.P.M.	Maximum Net Torque (Lb. Ft.) at Specified R.P.M.	Compression Ratio-to 1	Compression Pressure— (Lb.) at Specified R.P.M.	Valve Arrangement	Prossure to
-	A, C. F.—Brill (1)1C-41 C-36 C-44 	36	Par CS CS Sub		420 369½ 420 420	3561/2	79 <sup>7</sup> / <sub>8</sub> -71 79 <sup>3</sup> / <sub>8</sub> -71 79 <sup>7</sup> / <sub>8</sub> -71 79 <sup>7</sup> / <sub>8</sub> -71	19500 14300 18000 19400	11.00/22 10.00/20 11.00/20 11.00/20	HS 190-2 HS 136 HS 180-1 HS 190-2	4-G 4-G	UF UF UF	6-514x6 6-412x5 6-5x6 6-514x6	477 707	49.0	220-2200 155-2400 200-2200 220-2200	340-1200 525-1200	6.00			acdg acdg acdg abcdg
-	Aerocoach (2) P47-37 P47-41 T47-36 P-371 P-411 P-411 T-361 T-451	37 41 36 40 37 41 36 45	Par Par CS CS Par Par CS	229 261 210½ 239½ 229 261 210½ 263½	396 396 420 367	352 381 378	80% 72½ 79% 70% 79½ 73 79½ 73 79% 71 80% 71 80% 71 80% 71	20000 13000 13500 15700 20000	10.00/20 11.00/20 10.00/20 11.00/20 10.00/20 11.00/20 10.00/20 11.00/20	Int. RED450 Cont. R6572 Cont. R6513 Cont. R6572 Int. Red450 Cont. 56749 Cont. U6501 Cont. R6572	4-G 4-G 4-G 4-G 4-G 4-G	TR TR TR TR TR TR TR TR	6-53/8x51/2 6-41/2x51/4	572 513 572 451 749 501	54.2 48.6 54.2 45.9 69.3 48.6	160-2500 210-2500 147-2500 240-2500 170-2500	500-1400 375-1400 500-1400 360-1200 575-1400 385-1500	6.75 5.92 6.75 6.30 5.73	140-200   130-200   140-200   122-160		abcdf abcdf abcdf abcdf abcdf abcdf abcdf
-	Beaver (3)	29 33 37	CS CS	154 164 188	321½ 331 354	156 169 192	79½-65½ 80¼-69¾ 80¼-69¾	11900	7.50/18 9.00/20 9.00/20	Int. BLD269 Int. RED361 Int. RED450	1-G	R R	6-3 % x4½ 6-4½x4½ 6-4¾x5	361	44.0		282-1200	6.30	110-160		acd abcd abcd
	Beck (4) Steeliner Mainliner	24 33	Par Par	193 220	322 396	262 323	76-68 81 <sup>1</sup> / <sub>4</sub> -69 <sup>3</sup> / <sub>4</sub>		8.25/20 10.00/20	IntBLD269 IntRED450			6-3-x4 <sup>1</sup> / <sub>2</sub> 6-4 <sup>3</sup> / <sub>8</sub> x5	269 450	30.4 45.9	100-3000 140-2400	220-1000 350-1000	6.13 6.30			abcd abcd
	Fitzjohn (5) Cityliner	33-35	CS Par	1651 <sub>4</sub> 1853 <sub>4</sub>	334 321 <sup>3</sup> / <sub>4</sub>	320 286	82 <sup>3</sup> / <sub>4</sub> -69 <sup>3</sup> / <sub>4</sub> 77 <sup>3</sup> / <sub>4</sub> -65 <sup>1</sup> / <sub>4</sub>		10.00/20 9.00/20	HerJXLD	4-G 4-G	FH	6-4x4½ 6-4x4½	339	38.4 38.4	131-3000 131-3000	272-1400 272-1400	7.00			abco
	Flxible(8) 37C1-47 25B1-47 25C1-47 23B3-47 29B1-47 23B2-47 21C1-47 33B7-48	37 25 25 23 29 23 21 33	Par Par Par Par Par Par	231 182 182 218 218 218 146 212	418½ 359¾ 359¾ 395½ 395½ 395½ 323¾ 395½	252 252 288 288 288 216	3014-711 8012-693 78-693 8012-693 8012-693 8012-693 8012-693	12800 11330 13450 13390 13450 10600	10.00/20 9.00/20 8.25/20 9.00/20 9.00/20 9.00/20 8.25/20 9.00/20	Che4 Bui FB320 Che Bui FB320 Bui FB320 Che Bui FB320	4-G 4-G 4-G 4-G	R R R R	&6-3 16 x 3 16 8-3 17 x 4 16 6-3 18 x 3 18 8-3 17 x 4 16 8-3 17 x 4 16 8-3 17 x 4 16 8-3 18 x 4 18 8-3 18 x 4 18	320 235 320 320 320 235	37.8 30.4 37.8 37.8 37.8	93 165 165	278-2200 192-†† 278-2200 278-2200 278-2200 192-††	6.70 6.62 6.70 6.70 6.70 6.62			adf acdf acdf acdf acdf acdf acdf
	GMC (8) TDM3207 TGM3207 TDM3616 TGM3616 TDM4507 PD-2903 PDA3702 PDA4101 TDH3207 TGH3207 TDH3616 TGH3616 TDH4066 TDH4066	37 41 32 32	CS Par Par Par CS CS CS CS	1811/2 1811/2 2101/2 2391/2 2391/2 218 218 247 1811/2 1811/2 2101/2 2391/2 2391/2	340 369 369 396 420 395 420 420 420 340 369 369 369 396	308 308 337 337 366 390 295 295 366 387 308 308 337 366 390	81 16 72 18 17 72 18 18 18 18 18 18 18 18 18 18 18 18 18	12876 14018 13354 15648 16216 13994 13136 16892 14120 14120 14600 14600 14250 16885	9.00/20 10.00/20 10.00/20 9.00/20 9.00/20 10.00/20 11.00/20 9.00/20 9.00/20 9.00/20 10.00/20	GMD . 4-71 Own . 477 GMD . 4-71 Own . 477 GMD . 6-71 GMD . 6-71 GMD . 6-71 GMD . 4-71 Own . 477 GMD . 4-71 Own . 477 GMD . 6-71 Own . 477 GMD . 6-71	4-G 2-D 2-D 2-D 2-D 4-G 2-D 4-G 2-D 4-G 2-D 4-G 2-D	TR TR TR TR TR TR TR TR TR TR TR TR	4 4 1 x5 6 4 2 x5 6 4 2 x5 6 4 1 x5 8 5 1 x5 8 6	477 284 477 426 426 284 426 284 477 284 477 426	48.6 28.9 48.6 43.3 43.3 28.9 43.3 28.9 43.6 28.9 48.6 43.6	154-2600 133-2000 170-2000 170-2000 170-2000 145-2600 200-2000 133-2000 154-2600 154-2600 170-2000	382-1000 400-1200 382-1000 545-1000 360-1200 345-800 425-1200 600-1200 382-1000 400-1200 382-1000 545-1000	6.00 16.	500-1000 140-1000 500-1000 500-1000 500-1000 500-1000 145-1000 500-1000 500-1000 140-1000 140-1000 500-1000 140-1000 500-1000		aber aber aber aber aber aber aber aber
	Mack (15)	37 41 41 45	CS	2371	396 420	3905	7978-71 7978-71 8018-711 8018-711 8018-711 8018-711	18650	10.00/20 11.00/22 11.00/22	Own EN510A Own EN510A Own EN672 Own EN672 Own EN672 Own EN672	4-G 4-G 4-D 4-G	TR TR TR	6-47 x51 6-47 x51 6-47 x6 6-47 x6 6-47 x6 6-47 x6 6-47 x6	510 672 672 672	47.2 57.0 57.0 57.0	158-2400 187-2000 165-2000 187-2000	400-1000 535-1150 480-1200 535-1150	6.07 6.15 14.7 6.15	135 1000 135 1000 500 1000		acd acd acd acd acd acd
	Pony Cruiser (9) 1947-1948			160 194	281 316		70-66 70-66		7.50/20 8.25/20	IntK-7	4-G 1-G		6-3 % x41	269	30.4	101-3000	222-1600 222-1600	6.30		1	abo
	Reo (10)	37-4 37-4	C CS	186 186		333 <sup>1</sup> / <sub>3</sub>			10.00/20 10.00/20	Cont.TH6427									110-125 110-125		abo
	Southern Coach (11) F-31			175 190	321½ 356½		8114-693 8114-693			Wau 6MZA			6-41/x48	404	1	120-2500	305-1300	5.90		L	abo
	Transit (7)		cs	179	3523		81-73	13200	9.00/20	Cont. B6427	4-G	TR	aq	-	1	127-2600				L	abo
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	White (13)		Tr	214 238	3951 4191				° 11.00/20 ° 11.00/20	Own244 Own244											abo

Mfg. Co.

(bb)—1200 to 1800 rpm

BL—Brown-Lipe (Spicer Mfg. Corp.)

Bos—American Bosch Corp.

Bui—Buick Motor Div.

c—Connecting Rods
al-Motor Truck Corp.

Cha—Chervolet Motor Div.

Cla—Clark Equipment Co.

Cont—Continental

CP—City Service and Parlor

CS—City service

d—Camshafi

### BUS CHASSIS



EL :	SYS	TEM	1		ECTE	RICAL		nor		TRA	NSN	MISSIC		Un		REA	R AXL	E		E	RAKE	S			SPR	ING	3		NNIN GEAR	
	reto		Make	au l	T	Battery					spe	-to 1		-						Servi	00	H	and		Front		Rear			of (Ft.)
Type and Type	mp	In.)	tank Capacity (Gal.)		Starter-Make	Voltage and Amp. Hours Capacity	Type	Max. Governed Speed—R.P.M.	Clutch-Make and Size (In. diam.)	Make	No. of Forward Speeds	Low Speed Ratio-to	Туре	9	Size of Series	Make and Model		Standard Gear Ratio-to 1	Type of Applicator	Total Lining Area (Sq. In.)	Drum Diam. (In.)	Operates on—	Total Lining Area (Sq. In.)	No. of Leaves	Length and Width (In.)	No. of Leaves	Length and Width (In.)	Front Axie-Make	Steering Gear-Make	Outside Diameter of Min. Turn. Circle (F
n.l	Up 2 Up 2 Up 2 Up 2	1	20 DI 90 DI 10 DI	RE	OR OR OR OR	12-1584 12-1584 12-158 12-158	Ce Ce Ce	51 52	Lg 15½ Lg 15½ BL 1	Spi / Spi	3	3.80	M M M	2 1	600	im5	9070W	5.57	AAAA	898 690 829 829	16½ 16½ 16½ 16½	Ds Ds Ds Ds	139 111 139 139	*****	59-7 60-7 66-7 66-7	1	76-8 72-8 76-8 76-8	Tim Tim Tim Tim	Gem Gem Gem	73 86
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### **AMERICAN**

CURRENT MODELS

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Line Number	MAKE AND MODEL	Wheelbase (In.)	Minimum Turning Outside (Ft.)	Clearance	Shipping Weight w Rubber Tires (Lb.)		Maximum	Lateral Adjustment	Height Above Ground	Length (In.)	Width (In.)	Height—To Highest Point (In.)	Standard Equipment	Front (In.)	Rear (In.)	Front (In.)	Rear (In.)	Belt	Drawbar	Nebraska Test Nur	Power Take-off	of .	Number of Reverse	pı
	Allis-Chalmers 18 B C WC	57 73 77 871/1 70	7 7 7 8 8 12	1278 21341 2314† 2914† 13	2060 2250 3310	40½ 40½ 52 645% 455%	52½ 52½ 80 75½ 56½	221/4 101/2	11½ 12½ 12½ 12½ 16 14¼	97½ 110½ 114 128½ 117½	525/8 5218 681/2 76/8 571/4	541/2 62 623/4 671/4 601/4	RT RT RT RS RS	22x4 22x4 24x4 24x4	36x6 36x6 40x6 40x6	5.00/15 4.00/15 4.00/15 5.50/16 5.50/16	9.00/24 8.00/24 9.00/24 11.00/28 11.00/28	16.31° 23.81° 31.43°	13.54 13.54 18.74 23.58 23.58	364	Op Op Op Op	3 3 4 4	1 2.6	80 5.30 10. 80 4.01 7.9 80 3.60 7.1 84 3.84 5.1 80 3.80 5.1
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	Case VA	83 75½ 54½ 66 82½ 65¾ 66¾ 89 66Å	81 92 9 10 Piv 12 8 10 Piv			46 44 48½ 50 48 52	72½ 88 72½ 80	18 17 N 29 21 N 33 <sup>1</sup> / <sub>4</sub>	****	1083 1263 1103 116 1343 111 138	43¾ 56¼ 74½ 61.9 61½	511/24 561/24 531/20 516 564 645/80 491/24 561/24 630 721/20	Op RT Op Op RT Op Op RT Op	25x4 21x3½ 25x4 24¾x4 28x5 25x4 30x6	42x3 42x8 48x2½ 42x11¼ 48x2½ 48x12	6.00/16 6.00/16 5.50/16 6.00/16 7.50/18	9/24 9/32 9/24 7.50/16 11/26 11/38 12.00/24 12/26 11/38 13.00/24 14.00/30 14.00/28			NT NT NT 367 NT 349 340	Op Op Op Op Op Op Op Op	4 4 4 4 4 4 4	1 2.5 1 2.6 1 2.5 1 2.5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	25 3.00 4.1 3.75 4.1 44 4.55 5.1 24 4.53 5.1 35 3.50 5.1 35 3.75 5.1 37 5.5 37 5.5 48 5.5 58
	I.H.C. Farmall-AV Farmall-AV Farmall-BN Farmall-BN Farmall-HV Farmall-MV Farmall-MDV McCDW6 McCDW9 McCDWB McCDOS6	7234 7234 8834 9134 9034 9034 936634 7634 8335 8335 8336 6634 7634 7634 7634 7634	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	2314 2314 2314 2314 2314 2314 2314 2314	1780 3335 4430 4415 5505 4745 5835 3350 4765 5780 6110 6015 6345 4010 3825 5110 4815 5125	44F 64R 56R 44R 60 52R 60 52R	68R 68 92R 84R 80R 72R 88R 72R 88R 72R 53R 557½R 457 441¾R 45R 45R 63R	3334 2614 26 30 26 30 1814 1814 1856 1856 1856	141/8 141/8 171/8 15 15 181/2 15 181/2 117/8 123/8 115/8 15 115/8 15 123/4 123	115% 107% 131% 146% 131% 146% 133 148 114% 125% 134% 139% 139% 120%	8578 96 8578 96 8578 5812 63 63 6938 6914 6938 6914 5512 65 5814	6314	RT RT RT RT Op RT Op Op Op Op Op Op RT RT RT RT RT RT	22½x4 22½x4 22½x4 22½x4 22½x4 30x6 30x6 30x6 34x6	51x6 51x8 51x8 40x8 42x10 42x10 48x12 54x12 54x12	6.00/16 6.00/16 4.00/15	8/24 8/36 8/24 10/38 10.00/36 11/38 10.00/36 11/38 10.00/36 12/30 10/30 10/30 10/30 10/30 10/30 10/30 10/30 10/30 10/30 10/30 10/30	19.00 19.22 19.00 27.504 39.234 38.504 36.56 36.00 27.894 38.744 36.38 52.004 49.17 49.00 27.504 38.504 38.504 38.504	17.00 25.50å 25.00å 34.44å 33.50å 33.04 31.50 25.67å 33.81å 47.06å 46.00å 44.78 43.50 25.00å 33.50å 33.50å 33.50å 33.50å	NT 331 NT 333 NT 328 NT 353 355 356 369 NT 370 NT NT NT NT		444555555555555555555555555555555555555	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	5 3.50 4.62 6.75 3.50 4.62 6.3 5.50 4.62 3.50 4.62 3.50 4.62 3.50 4.62 3.50 4.62 3.50 4.60 3.37 4.62 3.50 4.60 3.37 4.62 3.50 4.65 3.00 4.62 3.50 4.65 3.00 4.62 3.50 4.65 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.0
	International I-4 Standard I-6 Standard ID6 Standard I-9 Standard ID9 Standard	7614	113/	12½ 11½ 11½ 13¼ 13¼	3760 4790 5120 6310 6585	50 52			101/4 101/4 121/8	113 <sup>3</sup> / <sub>4</sub> 125 <sup>1</sup> / <sub>4</sub> 125 <sup>1</sup> / <sub>4</sub> 132 <sup>1</sup> / <sub>4</sub> 132 <sup>1</sup> / <sub>4</sub>	64 6734	62 <sup>3</sup> / <sub>4</sub> 68 <sup>3</sup> / <sub>4</sub> 68 <sup>3</sup> / <sub>4</sub> 69 69	RT RT RT RT RT			5.59/16 6.00/16 6.00/16 7.50/18 7.50/18	12.00/24 13.00/24 13.00/24 13.00/32 13.00/32	27.50 38.50 36.00 52.00 49.00	25.00 34.00 32.00 46.50 44.00		Op Op Op Op	5	1 2.2	20 3.60 5 20 3.60 5 20 3.60 5 30 3.10 5
	John Deere (1)	90 90 76 76 91 70	8% 8% 1324 914 814		4052 4909 2750	56 52 52 60 55	88 88 52 52 84 55 52	27 2434 391/2		1331/4 1251/4 1251/4 1371/4 1301/4	64 64 843/	595/8 641/2 67 57 867/8 863/4 66	RT RT RT RT RT RT			5.50/16 5.50/16 5.00/15 6.00/16	10.00/38 11.00/38 9.00/24 13.00/26 13.00/26 12.00/38 9.00/24	39.80	19.19 26.52	380 384 387 378 383 383	St	4 4 6	1 2.1 1 1.1 1 2.1 1 2.1	00 2.50 3 50 3.50 4 52 3.12 4 00 3.00 4 00 3.60 4 50 3.50 4 52 3.12 4
	Massey-Harris Pony Std20 RC-20 Std30 RC-30 Std44 RC-44 44-8	79.3	101	21 11½ 12½ 12½ 13½ 13½ 16¼ 16¼ 12½	3770	47 48 52½ 54½ 54½ 52 52	72 47 88 52½ 88 54½ 86 88 57	111/2 111/2 111/2 111/2 111/2	15 10 <sup>1</sup> / <sub>8</sub> 11 <sup>1</sup> / <sub>4</sub> 7 <sup>5</sup> / <sub>8</sub> 11 <sup>3</sup> / <sub>4</sub> 10 <sup>5</sup> / <sub>8</sub> 14 <sup>1</sup> / <sub>16</sub> 14 <sup>1</sup> / <sub>16</sub>	1255/ 128 1271/ 1351/ 1351/	81½ 64¼ 79 68¾ 79	60 73 76 713/8 741/4 771/2 80 80 78	RT RT RT RT RT RT RT RT RT			4.03/15 5.00/15 4.03/15 5.03/15 5.03/15 6.00/16 5.50/16 7.50/18	9/24 10/28 9/32 11/28 10/38 13/30 12/38 12/38 14/34	24.90 28.00 28.00 36.00 36.00 36.00	12.80 16.20 16.20 20.00 20.00 27.00 27.00 27.00 36.00		Op Op Op Op Op Op Op	3 4 4 5 5 5 5 5 4	1 2. 1 2. 1 2. 1 2. 1 2. 1 2. 1 2.	74 3.59 7 15 3.51 4 57 3.69 4 19 3.06 3 58 3.61 4 21 3.33 4 48 3.75 4 76 3.85 4 96 4.22 5
	M-M (3) Standard-R Universal-R Universal-RN Universal-RN Universal-RT Standard-Z Universal-ZT Universal-ZT Universal-ZT Universal-L Standard-L Industrial-L Standard-GT	69 76 661 763 841 721 82 82 82 901 188	9 71 12 12 71 8 16 9 8 8 16 81	25 25 21	2950 3150 3500 3700 3700 3800 5200 5200 7300	52 46 (c) 52 52R 48	84 (a) 84 (b) 84 84 84 84 84 83 (i) (k 62R		12 12 16 12 14 14 14 14 15 15 15 10 14	104 116 125 122 1283 125 1363 1413 1303 126	59 82 82 58½ 81 81 2 81 2 84½ 70 76	6114 6114 88 88 88 88	RT RT RT RT Op Op Op RT Op			5.00/15 5.00/15 7.50/16	9/36 9/36 12.00/24 9/36 10/38 10/38 10/38 10/38 12/38 12/38 12/38 12.00/38	20.49 20.49 22.00 20.49 27.95 27.95 27.95 38.48 38.12 38.48 49.00	17.00 15.58 15.58 20.98 20.98 20.98 20.98 28.32 30.86	NT 352 NT NT 319 310 NT	Op Op Op Op Op	4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	12. 12. 12. 12. 12. 12. 12. 12.	40 3 .40 4 40 3 .40 4 20 3 .20 4 40 3 .40 4 40 3 .40 4 30 2 .70 3 30 2 .70 3 30 2 .70 3 30 2 .70 3 30 3 .20 3 50 3 .50 4

For abbreviations see pages 150 and 151

## **TRACTORS**



OF WHEEL TYPE

Travel S	Spe	eds a	ıt ıd		ENGI	INE					FUEL	-									PU	LLEY			,	CAP		IES		
Engine with S	e R. Stan heel	P.M.		Make and Model	Number of Cylinders— Bore and Stroke (In.)	Piston Disp. (Cu. In.)	R.P.M. at Governed Speed	Valve Arrangement	Number of Main Bearings	Diameter of Main Bearings	Standard	Optional	Ignition—Make	Carburetor or Injector Pump-Make	Air Cleaner-Make	Governor-Make	Oiling System—Type	Cooling System—Type	Clutch-Make and Type	Final Drive—Type	Diameter (In.)	Face (In.)	Normal R.P.M.	Steering Type	Cooling System (Gal.)	Fuel Tank (Gal.)	Grankcase (Qts.)	Transmission (Qts.)	Final Drive Case (Qts.)	Starting Method
				Own1B OwnB OwnC OwnW OwnW		125 125 201	1400 1400 1500 1300 1300	1	3 3 3 3 3	2¼ 2¼ 2¼ 2¼ 2.47 2.47			FM FM FM FM	Zen Zen Zen Zen Zen	Don Don Don Uni Uni	Own Own Own Own Own	P	Pu Pu Pu Pu Pu	RocSP RocSP RocSP RocSP	SG SG	8 8 8 9 9	5½ 1 5½ 1 5½ 1 6½ 1 6½ 1	054 F 129 S 170 S	FK SA SA	2 2 2 3½ 3½	13 13 13 15 15	4 4 6 6	7 6 6 4 4	113/4 113/4 113/4 113/4	
			2.64	HercZXB	4-31/4×4		1450 1800		3	2 2	G	****	DR DR	Tii Tii	Vor	Han Han	P	TS TS	RocSP RocSP	SG	6	6½ 1 5½ 1	990		23/4 13/2		5	10 5	11/2	
00 00 00 88 00 00 00 20 75			3.50 3.64 3.63 2.75 2.75 2.82 3.00 2.75 2.88 3.25	Own. VA Own. VA Own. VA Own. VA Own. S Own. S Own. S Own. S Own. D Own. D Own. D Own. LA Own. LA	4-31/4×4 4-31/4×33/4 4-31/4×33/4 4-31/5×4 4-31/5×4 4-31/5×51/2 4-31/6×51/2 4-31/6×51/2 4-31/6×51/2	124 124 154 154 154 259 259 259 403	1425 1425 1425 1800 1550 1550 1200 1200 1200 1100	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	33333333333333	2½ 2½ 2½ 2½ 2½ 2½ 2½ 2½ 2½ 2¼ 2¼ 3		000000000000000000000000000000000000000	Own Own Own Own Own Own Own Own Own Own	Mar Mar Mar Zen Zen Zen Zen Zen Zen Zen	Vor Vor Vor Uni Uni Own Own Own Own	Own Own Own Own Own Own Own Own Own Own		Pu Pu Pu Pu Pu Pu Pu Pu Pu Pu	SP SP SP SP SP TD DO TD DO Roc MD	SG SG CH CH CH CH	10¼ 10¼ 10¼ 9¼ 9¼ 12¼ 12¼ 12¼ 13	6 6 6 1 6 1 1 6 1 4 1 7 1 4 7 1 4 8 1 4 1	078 I	SA FK FK SA FK SA FK SA FK	31/4 31/4 31/4 4 4 71/4 71/4 151/4 151/4	15¼ 15¼ 14 18 18 19 31	4 4 4 5 5 7 7 7 12 12	28 28 28 22 36 36 36 40 40 40 68 68	48 -	HEE HEE HEE HEE
62 75 62 62 62 62 75 15 10 15 16 12 16 16 16 10 16 16 17 18 15 16 16 16 16 16 16 16 16 16 16	62 25 25 00 25 00 00 37 37 50 87 50 87 00 00 00 00		2.75 3.62 2.75 3.00 2.87 3.12 3.12 2.75 2.62 2.75 3.12 2.75 3.12 1.62 1.62 1.75 1.75 1.75 1.75 2.76	Own. LA Own. Own. Own. Own. Own. Own. Own. Own.	4-3x4 4-3x4 4-3x4 4-3x4 4-3x4 4-3x64 4-3x64 4-3x654 4-3x654 4-3x654 4-3x655 4-4.4x5.5 4-4.4x5.5 4-3x6554	113 113 113 113 1152 248 248 248 248 248 335 335 335 152 248 248 248 248 113	1400 1400 1400 1450 1450 1450 1450 1450	Oh O	333333355335533553355	21/8 8 21/1 2 2 2 3 3 3 1 2 3 3 3 1 4 1 2 2 2 3 3 3 1 4 1 2 2 2 3 3 3 1 4 1 2 2 2 2 3 3 2 1 2 2 3 3 2 1 2 2 3 3 2 1 2 2 3 3 3 2 1 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 2 3 3 3 2 1 2 3 3 3 3	GGGGGDD,GGGDD,GGGGGGGGGGGGGGGGGGGGGGGG	K,DG,KK,DK,GG,KK,GG,KK	Own Own Own Own Own Own Own Own Own Own	MS-2 MS-2 Own Own Own Own Own Own Own Own Own Own	Don Don Don Don Don Don Don Don Don Don	Own		TS TS TS Pu Pu Pu Pu Pu Pu Pu Pu Pu Pu Pu Pu Pu	RA. SF RA. SF RA. SF RA. SF Rac. SF Ra	SGG	934 11 11 11 11 11 14 14 14 14 14 11 11 11	6 1 6 7 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 7 1/2 1 6 6	019 899 899 899 019 899 707 707 707 707 707 1019 1019 899 899 899	FSSSSFSSFSSFSFFFFFFFFFFFFFFFFFFFFFFFFF	6 634 634 414 634 10 10 11 11 414 614 614 634 314	11 11 17 17 17 21 21 21 21 21 21 36 36 36 36 17 21 21 21 21 21 21 21 21 21 21 21 21 21	8 9 9 6 8 9 11 11 11 6 8 9 5	5 5 5 24 24 52 52 52 52 24 52 52 40 40 40 24 24 52 52 52 52 52 52 52 52 52 52 52 52 52	††3½ ††3½ ††3½	
.40 14.	30		2.60	OwnI-6 OwnID-6 OwnID-6 OwnIS-9	4-37/8x51/4 4-37/x51/4	248	2 1650 3 1450 3 1450 5 1500 5 1500	1 1 1	3 3 5 3 5	21/2 28/4 33/4 41/8]	G G O G	K, D	Own Own Own Own Own	Own Own Own	Don Don	Own Own Own Own Own	P	Pu Pu Pu Pu Pu	RocSF RocSF RocSF OwnSF OwnSF	SG	93/4 11 11 14 14	7½ 7½ 7½ 8½ 8½ 8½	899 899 707	FK FK FK FK	41/4 61/4 63/4 10 11	17½ 21 21 36 36	6 8 9 11	24 52 52 40 40	**	HEHE
.50 5. .75 7. .50	.75	10.0	2.50 4.00 3.21 3.21	Own	2-4+1x5½ 2-5½x6¾ 2-5½x6¾ 2-5½x6¾ 2-5½x6¾	190 321 321 321 412 50	975		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	21/4 23/4 23/4 23/4 3 3	GGGGGGG	D, K	Wico Wico E-A	Mar Mar Mar	Don Don Vor Uni Don Don	Own Own Own Own Own Own	PP	TS TS TS TS TS TS	OwnSI OwnSI OwnSI OwnSI OwnSI OwnSI	PSG PSG PSG PSG PSG	12 <sup>1</sup> / <sub>4</sub> 12 <sup>8</sup> / <sub>4</sub>	7% 7¼ 7¼ 8½ 8½	975 975 975 975 975 975 900 1730	SA FK FK FK	68/4 83/4 8 13 14 4	14 14 16 16 17 231/2	934	16 28 32 32 32 28 6½		Ele Ele
.02 .68 .35 10 .31 12 .75 12 .46 13	 .71 .63 .28 .82		3.2 2.4 2.5 2.4 2.9 2.8 3.2	2 Cont	4-2% x3 <sup>1</sup> / <sub>2</sub> 4-3x4% 4 4-3x4% 5 24-3 <sup>1</sup> / <sub>3</sub> x4% 6 4-3 <sup>1</sup> / <sub>3</sub> x5 <sup>1</sup> / <sub>2</sub> 6 8-3 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>3</sub> 6 8-3 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>3</sub>	12 12 16 16 26 26 22	2 1800 4 1500 4 1500 2 1500 2 1500 0 1350 0 1350 6 1500 2 135	D L D L D C L D C C C C C C C C C C C C C C C C C C C	3 3 3 3 3 3 4	21/4 21/4 21/4 21/4 27/8 27/8 27/8 31/4	GGGGGGGG	000000	AL AL AL AL AL AL AL	Mar Mar Mar Mar Zen Zen Mar Zen	Don Don Don Don Don Don	Novi Own Own Novi	9 9 9	TS Pu Pu Pu Pu Pu Pu Pu	BB	PSG PSG PSG PSG PSG PSG	91/ 131/ 131/ 131/ 131/ 131/	30	1224 1224 838 838 863 863 838	FK SA FK SA FK SA	114 234 234 234 534 61	20 20 20 25 25	3.3 4 4 5 5 9 9 6	3 8 8 24 24 24 24 24 17	164	Ele Ele Ele
2.30 1,50 2.30 1,50 2.30 4.80 15 4.80 15 4.80 15 4.80 15 6.40 14 6.40 14			. 2.7 . 2.7 . 2.5 . 2.7 . 1.1 . 1.1	0 Own E 0 Own E 0 Own E 0 Own E 0 Own E 0 Own R 0 Own R 0 Own R 0 Own R 0 Own R 0 Own R 0 Own S3A 0 Own . 283A 0 Own . 283A	E 4-356x4 E 4-356x4	16 16 16 16 16 18 18 18 18 18 28 28 28	5 140 5 140 5 150 5 140 5 150 5 150 5 150 5 150 3 127 3 127 3 130 3 110	0 11 0 11 0 11 0 11 0 11 0 11 10 11 10 11	h 2 h 2 h 2 h 2 h 2 h 2 h 2 h 2 h 2 h 2	233	G	000000000000	DR DR DR DR DR FM FM FM DR DR	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	Uni Uni Uni Uni Uni Uni Uni Uni Uni Uni		PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	Pu Pu Pu Pu Pu	TDS RocS TDS TDS TDS TDS TDS TDS TDS TDS	PSG PSG PSG PSG PSG PSG PSG	123 123 123 123 14 14 14 14 14	4646	933 1000 933 933 788 786 786	FK SA FK FK FK SA FK SA FK FK	31, 31, 31, 31, 31, 31, 31, 31, 31, 31,	14 14 14 14 163 163 163 213 213 213	777777779999	17 18 18 18 28 28 28 28 52 52 52 52	***	

TYF

Tra Nor En

6.10 6.16 6.16 6.08 6.08 5.88 5.82 5.60 5.55 6.16 6.07 17.95 5.87 6.02 5.72

19.10 23.20

(i)—F 1—In Ih—B (j)—F (k)—I (K)— (l)—F L—''] Lg—I Mar— MD— MO—

TR

Tra Nor En

(M.P.H.)

Gear Fifth 5.47 4.62

5.10 5.40 5.80 6.00 3.80

5.40 5.30 5.30 4.80 4.60 4.00

DU Ele GE GN Hai He

M

				G	ENERA	<b>L</b>			RAW-		VERA				WHE	ELS			P. ING					at	vel S	peeds mal
	Rowcrop60K Standard60H Standard60K Rowcrop70H Rowcrop70K Standard70H Standard70H		Radius	(ln.)	ith		EAD In.)	t (In.)	Ground (In.)			st	nt		EEL and Face	TIR	E SIZE			mber		d Speeds	Speed	Engin (N with	ne R.	H.)
Line Number	AND	Wheelbase (In.)	Minimum Turning Outside (Ft.)	Ground Clearance	Shipping Weight with Rubber Tires (Lb.)	Minimum	Maximum	Lateral Adjustment	Height Above Gro	Length (In.)	Width (In.)	Height—To Highest Point (In.)	Standard Equipment	Front (In.)	Rear (In.)	Front (In.)	Rear (In.)	Belt	Drawbar	Nebraska Test Number	Power Take-off	Number of Forward	Number of Reverse	First	Second	Third
1 2 3 4 5 6 7 8 9 10 111 12 13 14 15 16 17 18 19 20	Rowcrop80KD Standard60HC Standard80KD Rowcrop70HC Rowcrop70HC Standard70HC Standard70HC Rowcrop80HC Rowcrop80HC Standard80HC Standard80HC Standard80HC Standard80HC Standard80HC Standard80HC	857 66 66 91 72 72 93 72 72 80 66 72 79 80 66 72 93 80	7)2 10 10 8 11,2 8,2 12,2 12,2 12,2 14 10 11,2 11,2 11,2 11,2	151/8 111/8 111/8 171/4 117/4 113/4 113/4 117/2 10 10 10 10 10 10 12 12 12 12 12 12 12 12 12	2200 2200 2100 2100 3300 3150 3150 4775 4600 4600 6200 6400 2060 3500 10400 4635 4970 5255	60 48 48 60 660 48 48 60 60 60 48 48 52 52 49 49 49 44 49 44	72 72 48 48 72 72 72 48 48 48 50 50 52 52 52 82 49 62 91 68	20,7	15 15 15 15 15 15 15 15 15 15 15 15 15	1315 1315 1213 1213 136 136 135 135 1423 1424 124 1323 111 115 145 1417 1417 1417	79) 4 56 56 80 ½ 61 ½ 61 ½ 65 65 60 62 96 68 80 ¼	83 83 76 76 8378 8378 87738 82 82 7438 8014 76 5934 8014 76 6812 7312 6714	SW SW RT RT SW SW SW SW SW SW SW RT RT RT RT RT	23x4\2 23x4\2 25x4 25x4 24x4\2 24x4\2 27x4\2 24x4\2 24x4\2 28x5 28x5 29x6 29x6	59½x16 44x10 44x10 46x12 46x12	5.00/15 5.00/15 5.00/15 5.00/15 5.50/16 5.50/16 5.50/16 6.00/16 6.00/16 6.00/16 6.00/16 7.50/18 7.50/18 7.50/18 7.50/18 7.00/20 6.00/16 7.00/20	9/32 9/32 10/24 11/38 11/24 11/38 11/24 11/24 11/24 11/24 11/24 11/24 11/20 13/40 13/40 13/40 13/40 13/40 13/40 13/24 14/30 9/24 14/30 9/24 14/30 13/26 13/2	41.34 42.43 41.36	30.18 22.04 21.19 21.16 31.03 36.88 29.55 34.21 17.50 30.00 50.00 38.40	NT NT 351 267 283 284 NT 300 365 301 183 NT	Op Op Op Op Op Op Op	55556666444445664666	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 2 2	2.582.60 2.602.522.522.52 2.522.44 2.522.52 2.522.42 2.522.60 2.522.60 2.522.60 2.522.60	3 3.45 3 3.45 3 3.45 3 3.45 3 3.45 3 3.35 3 3.35 3 3.35 3 3.45 3 3 3.45 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	5 4.5i 5 4.5i 8 4.6i 8 4.4 4.44 4 4.44 2 4.3i 3 3 4.1i 3 3 4.5i 3 4.6i
21	Silverking (2)348	83% 66%	7 9	29 16½	3350 3000		84 72	27 27	15 15	131 11334	72½ 67½	78 73	RT RT			7.50/16 6.50/16	10.00/38 10.00/28	34.60 34.60	22.50 21.40		Op Op	4	1	2.67 3.25	7 4.1	0 5. 8 7

### **ABBREVIATIONS**

- \*-Included in transmission.
  †—Clearance at rear axle.

  -Rated using gasoline.
  \*-Rated using distillate.
  †-Clearance at front axle.
  -64 to 85 (In.)
  -To top of steering wheel.
  -To top of hood.
  \*-5 with rubber tires.
  ††-Capacity final drive—Each case.
- Total capacity final drive cases.
   On gasoline with high compression engine, tractor equipped with pneumatic tires.
   (1) Deere Mfg. Co.
   (2) Fate-Root-Heath Co.
   (3) Minneapolis Moline Power Implement Co.
   (a) Front tread: 47½ 54½.
   AL Auto Lite.
   (b) Front tread: 7½ − 14.
  Ba Ball bearing.

- BB—Borg & Beck Div.

  Bos—American Bosch Corp.
  (e)—Front tread: 48" Minimum.
  CH—Chain.
  Cont—Continental Motors.
  (d)—Overall dimensions—Front 56½".
  D—Distillate.
  D0—Double plate operating in oil.
  DR—Delco-Remy Div.
  Don—Donaldson.
  (e)—Front tread: 47½-53½.
  E-A—Edison Splitdorf or Auto-Lite.

- Ele—Electric starting.
  F—Front wheel tread.
  (f)—Front tread: 7-14½.
  FK—Front axle knuckle.
  FM—Fairbanks Morse.
  FO—Fork type.
  G—Gasoline.
  (h)—3° Rear; Front S.A.E. 212 Reiler Han—Handy Governor Corp.
  HC—Hand or rank.
  HE—Hand or Electric.
  Here—Hercules Motors Corp.

### **CURRENT MODELS OF**

			GE	ENERAL			DRA BA			ENSI(		TRA	CK	RATI						XIMU F NOF EN		GOVE	RNE		Nor	rmal ( ngine	Gover	rned
-	TRACTOR	ladius —	n.)	nt (Lb.) (Minimum	Tre	ad		(In.)		(In.)	Point (In.)		In.)				spa	sps								Ĥ	?	E.
Citie regiment	MAKE AND MODEL	Minimum Turning Radius Outside (Ft.) (Minimum Tread)	Ground Cleanance (In.)	Shipping Weight (Lb Standard Shoe (Min Tread)	Minimum (In.)	Maximum (In.)	Lateral Adjustment At Pin (In.)	Height Above Ground	Length (In.)	Width Maximum (Minimum Tread)	st	Width or Shoe— Standard (In.)	Length on Ground (In.)	Belt	Drawbar	Power Take-off	No. of Forward Speeds	No. of Reverse Speeds	First Gear (Lb.)	Second Gear (Lb.)	Third Gear (Lb.)	Fourth Gear (Lb.)	Fifth Gear (Lb.)	Sixth Gear (Lb.)	First Gear (M.P.H.)	Second Gear (M.P.H.	Third Gear (M.P.H.)	Fourth Gear (M.P.H.)
	Allis-Chalmers HD-5 HD-70 HD-10 HD-19H	7 824			44 52 62	60 63 74 84	32	113/8	125 15 127 4 150 19034	62 70 8214 10914	603/84 661/64 773/44 871/8	18		45.10 71.08 101.62 163.00	37.50 60.10 86.63	Op	5 4 6 ‡	1 1 2 1 1 1		5890 9705 14800 ‡	4200 7015 11100	3375 4070 8060		*****	1.59	2.44 2.19 2.06	2.97	75.
	Caterpillar Diesel-D2 Diesel-D4 Diesel-D6 Diesel-D7 Diesel-D7 Diesel-D8	6½ 8½ 8¼	9 111 121 151 101	16725	40 44 60 74 70	50 60 74 74 78	20 21 27 <sup>3</sup> / <sub>4</sub> 36 43		149 3 152 4	553/4 62 801/2 97 1033/4	573/8 605/8 751/4 80 90	12 13 16 20 22	54½ 61½ 8558 93¼ 9758	32.00 43.00 65.00 92.84 144.00	75.00	Op Op Op	5 5 5 6	1 1 4 4 2	6250 9450 15500 21351 28700		3800 5470 7320 9090 17500		2690 3130 4550		1.40	2.50 2.40 2.30 2.30 2.30 2.30	3.00	0 3.
	I.H.C. (1) TracTracTor-T-6	51/2 6 6 71/2 8 81/12	83, 101, 103, 113, 14, 137,	9300 9525	40 40 44 44 56 62	50 50 60 60 74 74 80	1978 1978 2778 3114	1214 1358 1358 1312 1538	104 114 114 134 <sup>1</sup> / <sub>8</sub>	53 53 591/8 591/8 741/8 821/4 102	62½ 62½ 66¾ 66¾ 73¾ 79 88	12 12 13 13 16 18 22	585/8 585/8 631/6 785/8 845/8	38.96 36.23 48.69 45.91 64.02 84.66 167.00	42.98 38.88 54.04 72.38	Op B Op B Op B Op	5 5 5 6 6 8	1 1 1 2 2 8	7652 7160 9868 9014 13426 18973 33600	5215 4929 6904 6637 9645 13357 25800	3368 4556 4368 7919 10561	2767 2641 3650 3551 5683 7827 16200	2304 3824 5157	2925 3833	1.50 1.50 1.50 1.50	2.20 2.20 2.20 2.20 2.20 2.10 2.00 2.00	3.10 3.00 3.00 0 3.00 0 2.50 0 2.50	0 3 0 3 0 3 0 3 0 3
	Oliver "CleTrac"-HG "CleTrac"-AG-6 "CleTrac"-AD "CleTrac"-BG "CleTrac"-BG "CleTrac"-BG "CleTrac"-DG "CleTrac"-DG	71/6 71/6 81/3 81/3 9	13½ 13½ 15½ 15½ 15½ 15½	7000 7600 4 8410 4 9025 4 12475 4 13325	31 42 42 44 44 48 48 69	68 50 50 52 52 61 61	25 21 21 14 <sup>3</sup> / <sub>8</sub> 16 <sup>3</sup> / <sub>8</sub> 16 <sup>3</sup> / <sub>8</sub> 25	143/4 17 17 17	91 1111½ 109½ 117 117 125 125 180	4114 5714 5714 6018 6018 6734 100	52½ 64 64 70½ 70½ 81½ 81½	12 12 14 14 16	50 62 62 63 63 74 <sup>3</sup> / <sub>4</sub> 74 <sup>3</sup> / <sub>4</sub>	22.00 38.80 38.00 50.00 48.09 69.00 67.71 130.00	30.66 30.56 38.06 38.06 61.26 61.19	O Op O Op O Op 5 Op O Op O Op	3 3 4 4 4 4 4	1 1 2 2 2 2 2 2		4160 4520 5700 5586	2640 2800 4200 4127 7000 7596	2000 2000 4156 4568			1.78 1.80 1.80 1.80	2 3.19 8 2.66 8 2.66 0 2.66 0 2.64 4 2.49 0 2.30 1 2.76	2 3.7 2 3.7 3 3.4 4 3.4 9 3.3 0 3.0	4 5 5 5 6 4
	Super-Trac(Half-Track) C	13	20	750	28	28	15	15	90	34	51	21/2	161/2	6.00		St	1	1							2.7	5		

### ABBREVIATIONS

- -Electric starter optional.
- Exclusive of tail pipes.Included in transmission.
- ••—Track length on ground 1013/6".

  ••—S530 lbs. in 6th gear, 6580 lbs. in 7th,

  4400 lbs. in 8th.

- \*\*-5.20 MPH in 6th gear, 6.10 MPH in 7th,
  7.80 MPH in 8th.
  \$\$-8 reverse speeds ranging from 1.60 to 7.70.
  \$\$\frac{4}{8}-192 q. (4s. including rear main frame cases.
  \*\*-1st speed range 0-3 MPH with 36,000
  lb. pull.
  \$\$\frac{1}{2}\$-2nd speed range 0-7 MPH with 28,000
  lb. pull.
- ‡‡—Low reverse speed range 0-5.5 MPH
  with 36,000 lb. pull.

  ^—With converter.
  (1)—International Harvester Co.
  A—Air.
  Atw—Atwood.
  BB—Ball bearing.
  Bos—Bosch.
  BS—Briggs & Stratton.

- Clu—Clutches.
  CP—Circulating splash.
  Cont—Continental.
  D—Distillate.
  Dif—Differential.
  Don—Donaldson
  DP—Double Plate, Dry.
  DR—Delco-Remy.

### TYPE-continued

Tr	avel S	peeds Govern	at ad		ENG	SINE					FUE	EL		-								BELT				CAF	PACI	TIES			
E	ngine	R.P.M tandard eels		Model	of Cylinders— I Stroke (In.)	(Cu. In.)	soverned Speed	Arrangement	Main Bearings	Mair			Make	or Injector ke	Make	Make	em-Type	-	Make and Type	-Type	(In.)		R.P.M.	9d	item (Gal.)	(Gal.)	(Qts.)	on (Qts.)	Case (Qts.)	ethod	
Fourth	Fifth	Sixth	Reverse	Make and P	Number of Bore and St	Piston Disp.	R.P.M. at Governed	Valve Arran	Number of Main	Diameter of	Standard	Optional	Ignition N	Carburetor or Pump Make	Air Cleaner	Governor	Oiling System	-		Final Drive	Diameter (I	Face (In.)	Normal R.P	Steering Type	Cooling System	Fuel Tank (Gal.)	Crankcase (Qts.)	Transmission (Qts.)	Final Drive Case	Starting Method	
6.10 6.16 6.08 6.08 5.88 5.82 5.82 5.60 5.55 5.55 6.16 6.07 7.95 5.87	7.50 7.25 7.25 7.25 11.67 7.48 7.22 7.40	13.25 13.25 12.80	3.32 3.35 2.52 2.52 2.44 2.44 3.08 3.08 2.96 2.96 3.23 3.23 3.25 2.4.11 4.64 4.75	Own Own Own Own Own Own Own Own Own Own	4 3 % x3 ½ 4 3 % x3 ½ 4 3 % x3 ½ 5 6 3 % x4 3 % 6 3 % x4 4 4 2 x5 ½ 4 4 2 x5 ½ 4 4 3 x 6 ½ 4 4 3 x 6 ½ 4 4 3 x 6 ½ 4 4 3 x 6 ½ 6 3 ½ x 4	201 201 201 201 298 334 298 344 443 120 201 443 231	1500		33334444433333333343444	2144442144422144422388888888888888888888	GDG OG DG DG GG GG GG GG	G G G G G	DR DR DR Bos Bos Bos Bos Bos Bos Bos Bos Bos Bos	Mar Mar Mar Zen Zen Zen Mar Mar Mar Mar Mar Sch Zen Sch Sch	Don Don Don Don Don Don Don Don Don Don	Own Own Own Own Own Own Own Own Own Own	PS PS PS PS PS PS PS PS PS PS PS PS PS P		BB. SP BB SP	SG SG SG SG SG SG	10 10 12 <sup>3</sup> / <sub>4</sub> 12 <sup>3</sup> / <sub>4</sub>	714 714 714 814 814 614 714 714	774 774 774 731 731 731 731 731 731 731 731 731 731	FK FK SA FK FK SA	21/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/	20	4 4 4 4 4 5 5 5 5 5 5 8 8 8 8 12 12 4 5 5 12 6 6 6	24 24 24 24 26 26 26 48 48 48 48 48 48 48 14	*** *** *** *** *** *** *** *** *** **	Ele Ele Ele HC HC HC HC HC Ele Ele Ele Ele Ele	
9.10 3.20			1.97	Cont. F-1	62 4-3 7 x 43/8 62 4-3 7 x 43/8	162 162	1800 1800		3	21/4 21/4	G G	***	DR DR	Mar Mar	Don Don	Pie Pie	P	Pu Pu	BBSP	SG SG	619 619			FO	3	113/4 113/4		7 7	**	Ele	

(i)—Front tread: 8½-14.

1-In head (Valves).

1h—Horizontal—In head (Valves).

(j)—Front tread: 56½-56½.

(k)—Kront tread: 56.

(K)—Front tread: 54½.

1—1; head (Valves).

1g—Long Mfg. Co.

Ma—Marvel-Schebler Carb. Div.

MD—Multiple disc operating dry.

MO—Multiple disc operating in oil.

MSH—Marvel-Schebler or Holley,
MS-Z—Marvel-Schebler or Zenith,
N—No or none,
Novi—Novi Equipment Co,
NT—Not tested
O—Diesel fuel,
Oh—Overhead
Op—Optional,
P—Pressure,
Pie—Pierce Governor Co,
Piy—Pivot,
PS—Pressure and splash.

Pu—Pump.

R—Rear wheel tread.

RA—Rockford-Atwood.

Roc—Rockford Drilling Mach. Div.

RT—Rubber tires.

S—Single front wheel.

SA—Solid axle.

Sch—Marvel-Schebler Carburetor Div.

SG—Spur gear.

SP—Single plate, dry.

St—Standard.

SW—Steel wheels.

TD—Twin Disc Clutch Co.
The—Thelander.
Til—Tillotson.
TS—Thermo-Syphon.
Uni—United Air Cleaner Div.
UDO—United, Donaldson or Oakes.
Vor—Vortox Mfg. Co.
Zen—Zenith Carburetor Div.

### TRACK LAYING TYPE

Travel Normal Engin	Ga	vern	ed				ENGI	NE					FL	JEL								oseq		BEL				CAP	ACIT	TIES		
Fifth Gear (M.P.H.) Sixth Gear (M.P.H.)	Donous Ball	Low Reverse (IV.P.M.)	High Reverse (M.P.H.)		Make and Model	Cycle	No. of Cylinders—Bore and Stroke (In.)	Displacement (Cu. In.)	R.P.M. at Governed Speed	S.A.E. or Tax Hp.	Valve Arrangement	Diam. Main Bearings (In.)	Standard	Optional	Ignition Make	Carburetor or Injector Pump - Make	Air Cleaner Make	Governor-Make	Oiling System—Type	System	Clutch—Make and Type	Oniver Trace to Tracel on Monthers	Diameter (In.)	Face (In.)	Normal B.P.M.	Steering Type	Cooling System (Gal.)	Fuel Tank (Gal.)	Crankcase (Qts.)	Transmission (Qts.)	Final Drive Case (Qts.) (Each Case)	Starting Method
5.47 1.62 6.0	1.	00 89 85	1.17	GM.	2-71 3-71 4-71 6-71	2	4-414x5	213 284	1800 1500 1600 1750		1 5	31/2	0		No No No	GM GM GM	DU Uni Uni Uni	GM GM GM	P	Pu Pu Pu Pu	Atw Atw Roc TD	SP SC SP SC SP SC	12	834 834 10 15	963 890 930 430	Clu Clu Clu	3 <sup>3</sup> / <sub>4</sub> 5 <sup>3</sup> / <sub>4</sub> 9 <sup>3</sup> / <sub>4</sub> 11	31		26 24	12 7 8 60	Ele Ele Ele
5.40 5.80 5.80 3.80 5.1	1.	60 5	5.40	Own Own Own	D6	4 4	4-4½x5½ 6-4½x5½ 4-5¾x8	350 525 831	1525 1400 1400 1000	32.4 48.7 52.9	1 5	284 312 312 334 384	0 0 0 0			Own Own	Don Don Don	Own Own Own Own Own	PP	Pu Pu Pu Pu Pu	Own . Own .	SP SO SP SO SP SO SP SO	14 13 17	7½ 8½ 8½ 8 12½ 8 15		Clu Clu Clu Clu Clu	11 1214 18	48 65	13 17 19 22 34	40	4 7 11 24 26	GE GE GE GE
5.40 5.40 5.30 5.30 1.80 5.8 4.60 5.7	1. 1. 30 1. 70 1.	.70 .70 .70 .50	3.40	Own Own Own Own	T-9	4 4 4 4	4-378x514 4-4.4x51/2 4-4.4x51/2 4-434x61/2 6-434x61/2	248 334 334 461 691	1450 1450 1400 1400 1350 1200	24.0 31.0 31.0 36.1 54.1	1 5 1 5 1 7				Own Own Own Own Own Own Own	Own	Don Don Don Don	Own Own Own Own Own Own	999	Pu Pu Pu	Roc Roc	SP SC SP SC SP SC SP SC SP SC	12 11 11 11 11 11 13	8 1/2 8 1/2 8 1/2 14 11 14 12 1/2	811 878 878 844	Clu Clu Clu Clu Clu Clu PL	9½ 10½ 12 13 19 26 37	20 31 31 45 60	9 11 11 16 26 28	16 16 22 22 24 30 ++	11/2	HE
	1.1.1.2.2.2.	.80 .80 .19 .02	3.44 3.45 3.94 3.64	Cont Herc Herc Herc Herc	DJXC	4 4 4 4	14-31/8x4 16-31/8x43/8 14-4x41/2 16-4x41/4 16-33/4x41/2 16-45/8x51/4 16-45/8x51/4 16-55/8x6	226 226 320 298 529 474	3 1700 3 1530 3 1530 3 1530 3 1400 3 1300 4 1200 5 1300	26.3 25.6 38.4 33.7 51.3	L 4 1 5 1 7 1 7	2½ 3 3 3½	0 0	K, E	Wi Bos DR DR	Til Til Bos Til Bos Til Bos Bos	Vor Vor Vor Vor Vor Vor	Han Novi Bos Pie Bos Pie Bos Bos	PPPP	Pu Pu Pu Pu Pu	Lg Lg Lg Lg Lg Lg	SP SI DP SI DP SI DP SI DP SI DP SI SP P	G 10 G 10 G 12 G 12 G 13 G 13	81/2 81/2 81/2 11	1130 1130 1150		6 5 10 <sup>1</sup> / <sub>4</sub> 10 <sup>1</sup> / <sub>2</sub>	18 18 23 23 30 30	5 8 13 6 12 12 16 34	36 52	**	HC* Ele Ele Ele Ele Ele
					zz				2700	1		1	G		BS	BS	Uni	BS	CP			SPS				1		2	21/2			нс

DU-Donaldson or United Air Cleaner Div.
Ele-Electric.
G-Gasoline.
Ek-Independent Gas Engine.
GM-General Motors.
Han-Handy Governor Corp.
Har-Hardy Governor Corp.
Hec-Hercules.
HC-Hand Crank.

HE—Hand Crank or Electric.

I—In head (Valves)

K—Kerosene.

L—'L'' Head.

Lg—Long Mfg.

No—No or None.

Novi—Novi Equipment Co.

O—Diesel fuel.

Op—Optional.
P—Pressure.
Pie—Pierce Governor Corp.
Pi]—Planetary.
Pu—Pump.
Roc—Rockford.
SG—Spur Gear.
SP—Single Plate, Dry.

St—Standard.
TD—Twin Disc Clutch Co.
Til—Tillotson.
TS—Thermo-Syphon.
Uni—United Air Cleaner Div.
Vor—Vortox.
Wi—Wico.



# AMERICAN COMMERCIAL

					Seated	Fue	M		Engine				Propello	rs*			Dimensio	ons (Ft. &	in.)	
CHARLES AND ADDRESS OF THE PARTY OF THE PART	MAKE AND MODEL	Туре	A.T.C. Number	Number of Crew	Number of Passengers Se	Capacity (Gal.)	Octane Recommended	Oil Capacity (Gal.)	Make and Model	Number Used	Take-off Hp. at Specified R.P.M.	Make	Туре	Diameter (Ft. & In.)	Number of Blades	Span	Overall Length	Height (Taxi Position)	Wing Area (Gross) Sq. Ft.	Aileren Area (Sq. Ft.)
1	Aero (1)L-3805	PC-L	Pend	1	4-5	115	73	3	Lyco 0-435	A 2	190-2550	Aero	c-cs	6' 6"	2	43' 10"	32' 0"	12' 0"	240.0	
1.	Aeronea (2)	PL-S PL	A759 A759 A796	1 1 1 1 1	1 1 1 3	13 13 23 18.6 38	80 80 80 80	11/8 11/8 51/6	Cont. A-65 Cont. C-85- Cont. C-85- Cont. C-85- Cont. C-145	F 1	65–2300 85 85–2575 85 145	S-L-M	Fxd	φφ (aa) (bb)	2 2 1 1	35' 2" 35' 2" 36' 1" 35' 2" 37' 6"	21' 6" 21' 6" 20' 5" 21' 6" 25' 3"	7' 0" 7' 0" 6' 7" 8' 8" 7' 0"	170.0 170.0 175.0	7.
1	All American (3)Ensign 10A	PL	792	1	1	20	80	11/4	Cont	15 1	85-2575	MC	Fxd	6' 2"	2	33′ 0″	22' 0"	9′ 0″	138.0	14
1	Beechcraft (4)	PL PL PL	A777 765 765 770 765	1 1 2 1-2	3 8 8 8 4-7	39 206 206 206 206 206	80 87 91 87 87	17 17 8½	Cont. E185 P&W . R985-AN1 Cont. R-1 Cont. R-1 P&W . S8	B 2 A 2 A 2	185-2300 450 525 525-2300 450-2300	Own Ham Ham Ham Ham	Cnt Cst Hyd-Mc Hyd-Mc Cst	7' 4" 8' 3" 8' 0" 8' 3" 8' 3"	2		25/ 2" 33' 11" 33' 11" 33' 11½' 33' 11½'	6' 6½" 9' 2" 9' 2" 9' 2½" 9' 2½"	177.6 349.0 349.0 349.0 349.0	22 22 22
	Bellanca (5)14-13-2	PL	773	1	3	40	80	2	Frank6A4-150-	3 1	150-2600	S-A	F-C	6' 2"	2	34' 2"	21'311/16"	5' 67/8"	161.5	
1	Boeing (6)	PL CL		5-7 3-5		7715 7715	115/145 115/145	200 200	P&WTSB3 P&WTSB3	G 4 G 4	3500-2700 3500-2700	Curt Curt	C-Ff-Fr	16′ 8″ 16′ 8″	4	141′ 3″ 141′ 3″	110′ 4″ 110′ 4″	38′ 3″ 38′ 3″	1720.0 1720.0	
	Call (7)A3	PL	758		2	27	73	2	Cont	25 1	125-2550	Sen	Fxd	6' 4"	2	35′ 10″	23′ 5″	7′ 0″	181.6	1
	Cessna (8)	PL-S	768 768 790 790			25 80	73 73 80 80	13/8 13/8 5 5	Cont	35 1 23 1	85-2575 85-2575 240-2200 300-2200	Sen Sen Ham Ham	Fxd Fxd Cst	6' 7" 6' 7" 7' 9" 7' 9"	2 2 2 2	36' 2"	21' 6" 21' 6" 27' 4" 27' 4"	6' 31/4" 6' 31/4" 7' 2" 7' 2"	159.3 159.3 218.0 218.0	1
ŀ	Convair (9) Press. Liner	PC-L		4	40	1000	100/130	140	P&WR28	00 2	2400-2800	Ham	C-Ff-Fr	13′ 1″	3	91' 9"	74' 8"	26′ 11″	817.0	4
	Curtis-Wright (11)CW-32	CL		20		3500	100/130	140	P&WCA15-28	00 4	2100-2800(e)	Curt	Rp-As	14' 7"	3	130′ 2″	88' 111/2'	34 41/2"	1400	
ł	Deuglas (12) DC6-1118 DC8-477C DC8-477B	PL	A781 A781 A781	6-8	52	4248	100/130	140	P&W CA P&W CA P&W CA	15 4	2100-2800 2100-2800 2100-2800	H-C H-C H-C	Cst-R Cst-R Cst-R	13′ 1″ 13′ 1″ 13′ 1″	3 3	117' 6"	100' 7"	28′ 5″ 28′ 5″ 28′ 5″	1463 1463 1463	
	Ercoupe (13)415-CD	PL	718	1	1	23	80	1	Cont	75 1	75-2275	Sen	Fxd	6′ 2″	2	30′ 0″	20′ 0″	6' 0"	142.6	
	Eshelman (14)EF100	PL	Pend		2	30	80	2	Frank4A4-100	33 1	100-2550	Sen	Fxd	5′ 10″	2	30′ 0″	18' 11"	5′ 8″	122.0	1
-	Fairchild (15)	PL	706 706				80 80	4	Rgr6-440- WarnerW50	C2 1	175-2450 175-2250		Fxd Fxd	7' 2" 7' 2"	2	36′ 4″ 36′ 4″	25' 101/4 23' 93/4"	7' 71/2"	193.3 193.3	
1	Funk (16)B850				. 2	20	73/80	41/	ContC85	12 1	85	Lewis	Fxd	6' 0"	2	35′ 0″	20′ 1″		157.1	
-	Grumman (17)		734 783				91 91	7 20		C5 2			Fxd FF	6′ 10″ 8′ 3″	2 3		31′ 0″ 48′ 4″	9' 0" 18' 9"	245.0 444.0	
	Lackheed (19) 649-79-21 	PC-L PC-L PC-L	763 763	7	44	5790	100/130 100/130	0 22	Wrt749C18B	D1 4	2500-2800	H-C	Rev Rev	15′ 1″ 15′ 1″	3	123′ 0′	95' 13/16"	23′ 0″ 23′ 0″ 50′ 0″	1650 1650	
	Luscombe (20)	PL PL PC-L	694 694 Pend	1	1		73 73 73	1 13 23	Cont	12 1	65-2150 85-2575 165	L-S	Fxd Fxd Fxd	6′ 4″ 6′ 0″ 6′ 8″	2 2 2	35' 0"	19' 11" 19' 11" 23' 0"	5′ 11″ 5′ 11″ 7′ 6″	140.0 140.0 165.0	0
	Martin (21)	2 CL			3	1030	100/13 100/13 100/13	0	P&W R2800C P&W R2800C P&W R2800C	118 2	2400	. Ham	Rev Rev Rev	13′ 1′ 13′ 1′ 13′ 1′	3	93' 33	8" 71' 4" 8" 71' 4" 74' 7"	32' 4½ 32' 4½ 26' 9¼	* 864.I	0
	Northrop (25)N-2	PC-L	s	. 2	3	8 1000	91	36	Wrt957C7	A1 3	800-2600	Ham	Cst-Ff	12′ 0″	2	87' 0"	66′ 6″	16′ 0″	1131.	
	Piper Cub (26)PA-1	PL-S	691 780		- 1	1 17 2 38	73		Cont		100-2600	. Sen Sen	Fxd Fxd	6′ 0″ 6′ 0″	2	35′ 2½ 35′ 5½	27 22' 41/2' 2" 22' 10"	6′ 8″ 6′ 10″	178. 179.	3
	Ross (27)	PL	732	2 1		1 12	73	1	Lyco 0-145	-B3	65-2550		. Fxd	5′ 10′	1 2	30′ 0″	20' 0"	7' 0"	147.	0
	Ryan (28) Nav-	4 PL	782	2 1		3 40		. 23	2 Cont		185	. Har	Cnt	7' 0"	1	2 33′ 43	2" 27' 3"	8' 61/4"	185.	0
	Stinson Voyager (9)108-	3 PL‡	767	7 1		3 50	80	21	Frank 6A4-165	-B3	185-2800	Sen	Fxd	6' 4"	1	2 33′ 11	25/ 2"	7' 6"	155.	
3	Temco (29)	BPL	766	6 1		1 273	80	13	4 Cont	125	125-2550	A-S	F-C	6' 1"	1	2 29′ 4″	20′ 10″	6' 2"	131.	
į	Thorp (30)T-1	1 PL	791	1 1	1	1 18	73	1	Lyco0-148	-B2	65-2800	Sen	Fxd	5' 6"	1	2 25′ 0″	17' 6"	7' 7"	105.	0

### **ABBREVIATIONS**

\*—Each
\*-Each
--With 37619 lb. load
†-With 121700 lb. weight
†+With 39500 lb. load
+-Plus

(aa)—Propeller diameters—68½, 70 or 72 inch.
(b)—730 ft. fixed propeller, 1130 ft. constant propeller
(bb)—Propeller diameters—69½, 70, 71 or 72 inch.
(c)—610 ft. fixed propeller, 475 ft. constant propeller
(d)—Dual
(e)—With fuel derichment and water injection
(h)—Or 3322 gal. fuel capacity
(m)—Operating weight, empty
(n)—Cruising speed 250 to 280
(p)—High blower, 29000 ft.
(r)—With water, 2130 ft.
(s)—High blower, 26500 ft.
(u)—High blower, 27400 ft.
(v)—With water, 27070 ft.
(w)—Without residual fuel and oil
(c)—Includes 9 qts. oil and 4 gal. gasoline
Aero—Aeromatic or Sensenich

C-Ff-Fr—Constant speed, fast feathering, fast reversing C-GS—Automatic controllable constant speed CL—Cargo land plane
Cnt—Controllable
Cont—Continental Motors Corp.
Cst—Constant
Cst-Ff—Constant speed, full feathering
Cst-R—Constant speed, full feathering
Cst-R—Constant speed, reversible
Curt—Curtis
Ele—Electric
F-C—Fixed with Sensenich, constant with Aeromatic
FF-F-Ill feathering
Franklin by Aircooled Motors Corp.
F-S-L—Fixed swivel, lockable
F-S-S-L—Fixed swivel, lockable
Frd—Fixed
Ham—Hamilton Standard Propellers Div.
Har—Hartsell propellers
H-C—Hamilton or Curtis

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A

# AND PRIVATE AIRCRAFT



		Weights	(Lb.)						P	erforma	nce						Main I	anding (	Gear	•	-		
																	-	Auxi	liary	Gear			
Empty	Gross	Gross Landing	Pay Load	Useful Load	Wing Loading (Lb. per Sq. Ft.)	Power Loading (Lb. per Hp.)	Maximum Speed at Altitude	Cruising Speed at Altitude	Fuel Consumption at Cruising Speed (Lb. per Hr.)	Range in Miles at Cruising Speed	Stalling Speed at Sea Level (m.p.h.)	Initial Climb (Ft. per Min.)	Service Ceiling with Normal Load (Ft.)	Take-off Distance (Over 50 ft. obstacle no wind) (Ft.)	Landing Distance (Over 50 ft. obstacle no wind) (Ft.)	Retractable	Method of Retraction	Tail or Nose Wheel	Retractable	Туре	Tread (Ft., In.)	Brake Type	
2400(a)	4200	4200	1112	738	17.8	11.0	181-SL	179-10000	120.0	700	56	1400	22000	950	850	Y	Hyd	Nose	Y		12' 0"	Opt	
750(a) 785(a) 820(a) 790	1220 1220 1350 1300 2050	1220 1220 1350		470 435 530	7.17 7.70	14.4	100-SL 100-SL 100-SL 103-SL 120-SL	90-SL 91-SL 95-SL 92-SL 105-SL	27.0 32.4 32.4	250 220 400 315 445	38 40 38 44 53	500 850 600 750 600	12000 16300 15600 16000 12400	575 1294 500 590	600 1172 550	N N N N		Tail Tail Tail Tail Tail	2222	Ste SS	5′ 10″ 5′ 10″ 6′ 0″	Mec Mec Mec Mec Hyd	
1000	1550	1550	390	550	11.2	18.0	120	100	5.5	400	55	700	12000	500	400	N	*****	Nose	N	Swi		Hyd	
558(w) 5635 5799 6000 (w) 5645 (w)	2550 8750 9000 9000 8500	2550 8750 9000 9000 8500	730 1626 1712	992 3115 3201 3000 2855	14.35 25.1 25.8 25.8 24.4	13.8 9.7 8.4 9.0 10.6	184-SL 229-4000 236-4000 236-4000 231-5000	172-8000 212-10000 231-10000 231-10000 211-10000	58.6 285.0 350.0 223.0 195.0	685 760 615 1040 1500	55 72 75	950 1250 1490 1490 1250	18000 21200 23800 23800 21200	1550 1650 1530 1530 1650	915 1460 1490 1490 1390	Y	Ele Ele Ele Ele Ele	Nose Tail Tail Tail Tail	Y Y Y Y	Swi SW-L SW-L SW-L SW-L	12' 11"	Hyd Disc Disc Disc Disc	
1200	2150	2150	635	950	15.3	14.3	170-SL	150-SL	57.0	600+	45	(b)	20000+	(c)	330	Y	Opt	Tail	N	Swi	10' 6"	Hyd	
7674 3105	135000 140000	121700 121700	25000 43000	57326 66895	78.5 81.4	9.65	375-25000† 375-25000†	320-25000† 320-25000†	3520 3520	4100 ± 4100 ‡	101 101	11304 10404	30000+ 30000+	39504 39504	3520 3520	Y	Ele Ele	Nose Nose	Y	Ste Ste	28′ 6″ 28′ 6″	Hyd	
1020	1550	1550		530	8.53	12.4	112-SL	102-SL	47.3	350	45	1000	17500	800	500	N		Tail	N	SS	8' 0"	Hyd	I
770 890 2050 2060	1450 1450 3350 3350	3350 3350	530 410	680 560 810 810	9.10	17.1 17.1 11.1 11.1	120 120 170-7000 180-7000	100 100 160-7000 165-7000	26.2 26.2 88.0 88.0	450+ 450+ 700+ 700+		680 680 1050 1200	15500 15500 16000 18300	1670 1500	2020 2020	N N N		Tail Tail Tail Tail	N N N	Fxd SS Ste Ste	6' 5" 6' 5" 7' 11" 7' 11"	Hyd Hyd Disc Disc	
15445	39500	37619	8300	14055	48.4	8.2	336-13500 <sup>△</sup>	300-16000♥		800+	85		30000	3800††	4140**	Y	Hyd(d)	Nose(d	) Y	St-L	25′ 0″	Hyd	ı
15415	98450	83300	33795	53035	70.0	11.7	326-16000	300-20000	2523	1500	96	1170	25400	2935	2680	Y	Hyd	Nose	Y	Ste	27′ 2°		
19346 52045 50600	84000 93200 84000	75000	15500 14280 14280	34654 41155 33400	57.4 63.7 57.4	11.0	358-19600 352-19500 358-19600	315-20400 301-20200 315-20400	2370 2455 2370	2110 3400 2110	88 88 88	1320 1100 1320	27000 25000 27000	4030 5170 4030	2904 2904 2904	Y	Hyd Hyd Hyd	Nose Nose Nose	Y	Ste Ste Ste	24' 8" 24' 8" 24' 8"	Hyd Hyd Hyd	
814	1260	1260	340	446	8.8	16.0	127-SL	107-SL	27.6	450	48	700	14000	520	250	N		Nose	N	Ste	8' 0"	Disc	
895	1510	1510	615	615	12.4	15.1	135-SL	118-SL	36.0	493	42	900	15000	600	400	N		Tail	N	Swi	9' 5"	Hyd	
1688 1651	2562		563 563	874 874				118-SL 118-SL	11.48	620 620	57 57	800 800	14000 14000	1100 1100	1000 1000	N		Tail Tail	N	Ste Ste	9' 3" 9' 3"	Hyd Hyd	
890	1350		460	460	8.0	15.9	112+-SL	100+-SL	29.1	400	37	800	15000	350	287	N		Tail	N	F-S-L	6' 0"	Hyd	
3240 9200	4525 12750	4525 12750		1285 3550				130-SL 180-8000	120.0 312.0	715 1330	50 71	1000 1290	15000 23000	895 2768	2715	Y	Hyd Hyd	Tail Nose	Y	SW-L Swi	7' 6" 12' 10"	Hyd Disc	
60158(m) 61493(m)	94000 102000 184000	84500		41919	57.0 9 61.8		356-19500 356-19500 300+-25000	328-23300 323-23300 250-25000 (h	2900 2900 **	3600 4000 4500+	88 88 - 80	1480 1280	25700 24100	3060* 3850*	2810* 2810*	YYY	Hyd Hyd Hyd	Nose Nose Nose	Y	Ste Ste Ste	28′ 0° 28′ 0″	Hyd Hyd Hyd	
720 850 1280	1260 1400 2280	1400		540 530 1000	10.0	16.5		105-SL 112-SL 130	28.8 35.2 60.0	300 650 500-	37 48 57	900 800 900	15000 16500 16000	575SL 575SL 700	426SL 462SL 280		*****	Tail Tail Tail	N N N	Ste Ste F-S-S-I	6' 4" 6' 4" 8' 4"	Mec Mec Mec	
25795(m) 23474(m) 24729(m)	39900 40750 37800		8929 14250 10021	1766	6		307-10000 307-10000 320-10000	255-7000 255-7000 287-7000	1116.4 1116.4 1230.	4 990	81 84 81		24400 (s	2220 (r) 2310 (t) 2340 (v)	2460	YYY	*****		YY	Ste Ste Ste			
15455		27500			1	1	200-5000	160-5000	517.0	1750	65			1200	1200	N			N	Sw-L	23′ 3″	Hyd	
735 1750	1220 1500		45	48			100-SL 115-SL	87-SL 105-SL	4.48	300 600	38 45			590 480	580 390	N			N	SS SS	6' 2½" 6' 2½"	Hyd Hyd	
555	995						103-SL	90-SL	3.8§	284	38	560	14000			. N		. Tail	N	Ste	4' 7"	Disc	
1680	2750		810	107	0 14.6	14.6	157-SL	150	. 10.5§	500	54	830	15600	1250	710	Y	Hyd	Nose	Y	Ste	8' 81/2"		
1294(z)	2400	2400	78	110	6 15.5	14.5	130-SL	130-5000	66.0	554	60	580	12600	2360	1880	N		. Tail	N	ss	7' 0"	Hyd (d	
1125	1710	1710	58	5 58	13.0	13.7	150-SL	140-SL	48.0	512	48	1000	16000	685	380	Y	Hyd	Tail	N	SS	9' 9"		
565	1050	1050	20	48	10.0	16.1	113-SL	108-7000	25.0	400	53	600	1200	800SL	. 800SI	N		. Nose	N	Ste	7' 2"	Hyd	

Hyd—Hydraulic
Hyd-Me—Hydromatic
Jac—Jacobs
L-S—Lewis or Senensich propeller
L-H-S—Lewis, Hartzell or Sensenich propeller
Lyo—Lycoming Div., The Aviation Corp.
Man—Manual
MC—McCauley propeller
Mec—Mechanical
N—No or None
Opt—Optional
PA—Passenger Amphibian
PC-L-Passenger and Cargo, Land Plane
PC-LS—Passenger Land Plane
PL—Passenger Land Plane
PL-S—Passenger Land or Seaplane
P&W—Pratt and Whitney
Rev—Reversible pitch
Rp-As—Reverse pitch, automatic synchronization

Rgr—Ranger engine
S-A—Sensenich or Koppers Aeromatic propellers optional
S-C—Sensenich or Curtiss
Sen—Sensenich or Curtiss
Sen—Sensenich or McCauley propeller
S-L—M—Sensenich, Lewis or McCauley propeller
S-M—Sensenich or McCauley propeller
SS—Swivel and steering
Ste—Steering
Ste—Steering, lockable
Swi—Swivel
Swi-L—Swivel
Swi-L—Swivel
Swi-L—Swivel
(1)—Aero Design & Engineering Corp.
(2)—Aeronea Aircraft Corp.
(3)—All American Aircraft
(4)—Beech Aircraft Corp.
(5)—Bellanca Aircraft Corp.
(6)—Boeing Aircraft Co.

(7)—Call Aircraft Co.
(8)—Cessna Aircraft Co.
(9)—Consolidated Vultee Aircraft Corp.
(11)—Curtis-Wright Corp.
(12)—Douglas Aircraft Co., Inc.
(13)—Engineering & Research Corp.
(14)—Cheston L. Eshelman Co.
(15)—Fairchild Personal Planes Div. of Fairchild Engine & Airplane Corp.
(17)—Grumman Aircraft Engineering Corp.
(19)—Lockheed Aircraft Corp.
(20)—Luscombe Airplane Corp.
(21)—Glenn L. Martin Co.
(25)—Northrop Aircraft, Inc.
(26)—Piper Aircraft Corp.
(27)—Ross Aircraft Corp.
(27)—Ross Aircraft Corp.
(28)—Ryan Aeronautical Co.
(29)—Texas Engineering & Mfg. Co., Inc.

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### BRITISH COMMERCIAL

				Seated	F	uel		Engine				Propelle	ers		D	imension	is (Ft. a	nd In.	)
Line Number	MAKE AND MODEL	Туре	Number of Crew	Number of Pgssengers Sea	Capacity (Gal.)	Octane Recommended	Oil Capacity (Gal.)	Make and Model	Number Used	Total Take-off Hp. at Specified R.P.M.	Make	Туре	Diameter (Ft. and In.)	Number of Blades	Span	Overall Length	Height (Taxi Position)	Wing Area (Gross) Sq. Ft.	Aileron Area (Sa. Ft.)
1 2 3 4	Airspeed AS-Consul Convertible AS65-Consul Ambulance AS65-Consul AS57-Ambassador	PL PL	2 2 2 5	5 4 5–6 28–48	1564 1564 1564 10004	87 87 87 100/130	154 154	A-S Cheetah X A-S Cheetah X A-S Cheetah X Bristol Centaurus	2	790-2450 790-2450 820-2300 5200-2700	FR FR FR DH	Fxd Fxd Fxd Cs-Fr	8' 0" 8' 0" 8' 0" 16' 0"	2 2 2 4	53′ 4″ 53′ 4″ 53′ 4″ 115′ 0″		11' 1' 11' 1" 11' 1" 18' 10"	348 348 348 1200	
5	Armstrong-Whitworth AW-55	TL	4	24-31	9904		3.6	A-S Mamba Jet	4	4000-145000	DH	Cs-Fr	10' 0"	3	-92' 0"	70′ 11′	25′ 1″	986	71
6 7 8	Auster Arrow-J2 Autocrat-J1 Avis-P	PL PL PC-L	1 1 1	1 2 3	154 154 344	73 73 80	1 1 3	Cont	1 1 1	75-2275 90-2200 135-2200	AC AC-FR AC	Fxd Fxd Fxd	6′ 0″ 6′ 0″ 6′ 10″	2 2 2	36′ 0″ 36′ 0″ 36′ 4″	22′ 9″ 23′ 5″ 23′ 6″	6' 6" 6' 6" 6' 5½"	185 185 185	18
9 10 11	Bristol Wayfarer 170 Freighter 170 Brabazon 167	CL	3 2 12	32-34 100	900 900 13500	100 100 100	39 39	Bristol Her. 672 Bristol Her. 672 Bristol Centaurus XX	2 2 8	3380-2800 3380-2800 20000	DH-R DH-R 8-Rot	Cst Cst Cst-F	14′ 0″ 14′ 0″ 16′ 0″	4 4 3	108' 0" 108' 0" 230' 0"	68′ 4″ 68′ 4″ 177′ 0″	21' 6" 21' 6" 50' 0"	1487 1487 5317	
12	ChrisleaAce-CH3	PL	1	3	284	87	44	D-H Gipsy Major 10	1	145-2400	AC	Fxd	6' 10"	2	36′ 0″	21′ 6″	7' 2"	177	18
3	Cunliffe-Owen Concordia	PC-L	2	10-12	2004	100	164	AlvisLeonides	2	1100-3000	Rot	Cs-Fr	9' 0"	3	56′ 8″	44' 10'	16' 8"	435	20
14	De Havilland Dove-DH104	PL-S	1-2	8-11	1684	100	12	DH Gipsy Queen	2	690-2800	DH	Cs-Fr		3	57′ 0″	33′ 4″		335	
15 16	Handley Page Hermes IV	PL PL	7	40-63 40-63	3802 3802	115	157 57.6	Bristol Her. 763 Bristol Theseus	4	8840-2900 9960-8200	DH DH	Cs-Fr Cs-Fr	13′ 0″ 13′ 0″	4	113′ 0″ 113′ 0″		29' 11' 29' 11'		
17 18 19 20 21 22	Miles Messenger Gemini M-68 Aerovan Marathon Merchantman	PL CL PC-L	1 1 1 2-3 1	3 3 9 20 20	364 664 1004 1904 2304 2504	87 73 73 8/ 100	5	Blkbn Cirrus Major Blkbn Cirrus Minor Blkbn Cirrus Minor Blkbn Cirrus Major DH Gipsy Queen 71 DH Gipsy Queen 30	2 4 2 4	155 200 400 310 1320 1000		Fxd Fxd Fxd Fxd Cst	6′ 6″ 5′ 6″ 6′ 6″ 7′ 6″	2 2 2 3 2	36′ 2″ 36′ 2″ 50′ 0″ 50′ 0″ 65′ 0″ 66′ 6″	24' 0" 22' 3" 33' 0" 34' 4" 52' 1½' 42' 9"	7' 6" 7' 6" 13' 6" 13' 9" 14' 3"	191 191 390 390 500 600	
23	PortsmouthAerocar Major	PC-LS	1	4-5	72	87	5	Cirrus Major	2	310-2450	FR	Cnt	6' 6"	2	42' 0"	26′ 3″	10′ 7″	255	13
24	Saunders-Roe SR-45	PFB		100+				Bristo! Proteus	10			CTR			220′ 0″	148' 0"			
25	Scottish Aviation Prest. Pioneer	PL	1	3	37.54	87	48	DH Gipsy Queen	1	250-2500	DH	Cst	7' 6"	2	49′ 9″	34′ 9″	9' 95%	390	34
26 27 28 29	Short Bros.   SA6   S25   SL5   SL0   SL0	PFB PFB	2 7 7 10	8 22 40 70	120 2032 3160 6112	100 100 100/130 100	9 112 1/5 283	DH Gipsy Queen 71 P& W R1839-903 Bristol Her. 753 Bristol Centaurus	4	700-2600 4800-2700 8000-2800 9600-2700	DH Ham DH DH	Cs-Fr Cst-F Cst-Cnt HCF	8' 3" 12' 1" 12' 9" 15' 9"	3 3 4 4	59′ 0″ 112′ 8″ 112′ 10″ 150′ 3″	42' 2" 86' 4" 87' 8" 107' 0"	15' 0" 32' 2" 37' 3" 33' 8"	353 1687 1687 2636	19

Cnt—Controllable
Ele—Electric
FA—Fairey Reed propeller
Fxd—Fixed
GCA—Girling cable operated
Ham—Hamilton Standard Propellers Div.
HCF—Hydramatic, constant speed, full feathering
Hyd—Hydraulie
Mec—Mechanical

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### Automotive Wholesaler Classification by Size of Inventory

(As of September, 1947)

		1			
	Size of Inventory (Dollar Cost Volume)	Number of Wholesalers	Percentage of Total Wholesalers	Total (\$) Inventory	Percentage of Total Inventory
150,000 to 200,000 to 300,000 to	9,999. 14,999. 19,999. 24,999. 29,999. 49,999. 74,999. 99,999. 149,999. 199,999. 299,999.	183 703 706 668 633 450 990 594 319 268 149 121	3.08 11.84 11.89 11.25 10.66 7.58 16.68 10.01 5.37 4.51 2.51 2.04	\$ 611,000 4,859,000 8,120,000 11,034,000 13,560,000 11,119,000 37,890,000 29,379,000 29,379,000 25,390,000 28,731,000 35,033,000	.18 1.48 2.47 3.36 4.12 3.38 11.52 10.73 8.93 9.84 7.72 8.74
Over 1,000,0	999,999 00	48 13	.81	32,381,000 23,077,000	9.86 7.02
Total.		5,937	100.00	\$328,781,000	100.00

The 5,937 wholesalers in the United States operate 1,442 branches. The inventories of the branches are consolidated with their parent organizations in the above breakdown of wholesaler inventories. An additional 360 specialty wholesalers carrying no inventory bring the total automotive wholesalers surveyed to 7,739.

Imperial gallons
 With Flaps down
 Includes 4 passengers and full luggage
 Includes 5 passengers and full luggage
 Includes 6 passengers and full luggage
 Includes 6 passengers and full luggage
 Shaft Hp. plus 320 lbs. Jet Thrust per engine
 Gallons instead of pounds
 Each
 Cargo

<sup>(</sup>d)—Dual
(e)—Equipped
(f)—At 150 M.P.H. at 5000 ft,
(g)—From water, 2300 ft,
(h)—At 173 M.P.H. at 5000 ft,
(k)—With 10126 lb, payload at 200 M.P.H. at 10000 ft,
(m)—With 9760 lb, payload at 178 M.P.H.
AC—Airscrew Co., Ltd.
CL—Cargo land plane

### AND PRIVATE AIRCRAFT



		Waigh	ts (Lb.)							Performa	nce						Main	Landing	Gea	r			
																	_	Auxili	ary	Gear			
Empty	Gross	Gross Landing	Pay Lond	Useful Load	Wing Loading (Lb. per Sq. Ft.)	Power Loading (Lb. per Hp.)	Maximum Speed at Altitude	Cruising Speed at Altitude	Fuel Consumption at Cruising Speed (Lb. per Hr.)	Range in Miles at Cruising Speed	Stalling Speed at Sea Level (m.p.h.)	Initial Climb (Ft. per Min.)	Service Ceiling with Normal Load (Ft.)	Take-off Distance (Over 50 ft. obstacle no wind) (Ft.)	Landing Distance (Over 50 ft. obstacle no wind) (Ft.)	Retractable	Method of Retraction	Tail or Nose Wheel	Retractable	Туре	Tread (Ft., In.)	Brake Type	Line Numbers
6150 6400 6050 30800	8250 8250 8250 47000	8250 8250 8250 47000	1250: 940† 1420° 10200	2470 2470 2550 17060	23.7 23.7 23.7 23.7 39.2	10 10 10 8.75	190-4800 190-4800 190-4800	145-10000 145-10000 145-10000 255-12500	88 88	920 920 920 1000	69* 69* 69* 86*	1180 1180 1180 1450	18700 18700 18700 25000	1440 1440 1440 3900	825 825 825 2550	YYY	Hyd Hyd Hyd Hyd	Tail Tail Tail Nose	Y N N Y	Swi Swi Swi St-L	27′ 6″	Pne. Pne Pne Disc	
22955	39500	34000	7500	13600	37.1	9.2	305-20000	276-20000	1360	1500	80*	2100	35000	900	1400	Y	Hyd	Nose(d)	Y	Ste		Hyd	
872 1052 1400	1450 1850 2550	1450 1850 2550	244 438 980	244 438 980	7.8 10.0 13.7	19.3 18.5 17.6	98-SL 120-SL 120-SL	87-SL 100-SL 100-SL	4§ 4½§ 6.4§	320 320 500	37 28 36	430 568 500	10000 14000 12000	1350 1350 1392	1350 1350 1200	N N		Tail Tail Tail	N N	Swi Swi SS	6′ 0″ 6′ 0″ 6′ 0″	GCA GCA GCA	
6082 5032	40000 40000 285000	40000 40000		12650 13700	26.9 26.9	11.8 11.8	224-6500 224-6500	162-5000 162-5000 250-25000		1435 1435 5000	70 70	935 935	16800 16800	2310 2310	2310 2310	N N Y	Hyd	Tail Tail Nose	N N Y	Sw-L Sw-L Ste	Ptn Ptn	Pne Pne Pne	1
1287	2250	2250	730	963	12.7	15.5	128-SL	115-2000	48.7	400	35	700	16500	1125	600	N		Nose	N	Swi		Hyd	1
9000	12500	12500	2050	3500	28.8	11.3	219-3500	172-8000	217	1140	80°	1300	22000	3300	3300	γ	Ele	Nose	Y	Swi	*****	Disc	1
5657	8500	8500	1185	2813	25.4	12.3	210-8000	179-8000	194	1135		850	20000	2370	2250	Υ	Pne	Nose	Y	Swi	13′ 9″	Pne	1
3137 0 900	82000 84000	75000 75000		28800 33300	58.2 167.8	9.2 8.4	357-20000 351-15000	300-25000 330-30000		3310 2680	105* 106*	838 1950	24900 29500	4200 4608	3480 3480	Y	Hyd Hyd	Nose Nose	Y	Ste Ste	Ptn Ptn	Pne Pne	1
1341 1930 3200	2400 3000 6000 5400 16550 13000	16550	905 1600 2200 3550 2000*	1059 1070	12.6 15.7 15.4 15.0(a) 33.0 21.6	15.5 15.0 15.0 19.0(a) 12.0 13.0	135-SL 145-SL 127-SL 230-6300 163-SL	121-SL 135-SL 130 112-SL 175-10000 152-SL	8.3§ 78 116	525 1015 800 800 900 965	25 35 46 60	950 650 650 575 1225 1100	13000 22000 16000	600 1080 630 1050 2445 1320	1365	2 4 2 2 4 2	Ele Pne	Tail Tail Nose Nose Nose Nose	2222	Swi Swi SS-L St-L SS-L St-L		Mec	1 1 2 2 2 2
2800	4200	4000	762	1400	16.5	13.6	167-SL	134-5000	88.5	653	57	1050	17000	1140	1050	Y	Pne	Nose	Y	Swi	12' 0"	Pne	2
	270000							350-40000		5500													. 2
3214	4200	4200	680	986	10.7	16.8	125-1000	110-5000	62	450	35	900	16000	760	540	N		Tail	N	Swi	9' 8"	Hyd	2
6660 19932 17760 e 19950 e	8700 60000 78000 130000	8700 56000 78000 130300	6780 12000	2040 20068 30240 50050	24.6 35.5 46.2 49.3	12.4 12.5 9.7 13.5	188-6200 236-5000 279-3400 267-12000	174-6600 201-10250 245-11500 229-8500		646 1850 2300(k) 4000(m)	71* 86* 98* 100*	815 660 925 765	21600 16000 17000 19200	1850(g) 4950 5400 6300	1880	¥	Pne	Tail	Y	Swi	10′ 0″	Pne	2 2 2 2

N—No or None
PA—Passenger Amphibian
PC-L—Passenger or Cargo, land plane
PC-LS—Passenger, Cargo, Land or Seaplane
PFB—Passenger Flying Boat
PL—Passenger land plane
PL-S—Passenger land or Seaplane
Pns—Passenger land or Seaplane
Pns—Patterned

P&W-Pratt & Whitney

P&W—Pratt & Whitney
Rot—Rotol
SS—Swivel, steering, lockable
SS—E-Swivel, steering, lockable
Ste—Steering
St-L—Steering, lockable
SW-L—Swivel, lockable
SWi—Swivel
TL—Transport land plane

Y—Yes
Cont—Continental Motors
Cst—Constant speed
Cst-Cnt—Constant speed, controllable
Cst-Fn—Constant speed, full feathering
Cs-Fr—Constant speed, full feathering and reversing
CTR—Contra-Rotating
DH—DeHavilland
DH-R—DeHavilland
DH-R—DeHavilland

### Passenger Car Tire Shipments, Production and Inventory

	Original Equipment	Replacement	Export	Total Shipments	Production	Year-End Inventory
1939	15,742,253	33,470,797	607,229	49,820,279	49,932,954	7,107,493
1940	19,560,272	30,902,707	411,099	50,874,078	50,965,429	7,270,192
1941	19,855,693	34,118,268	586,423	54,560,384	50,391,918	3,165,132
1942	871,997	2,664,904	37,852	3,574,753	2,751,873	4,432,038
1943	81,917	10,605,445	71,655	10,759,017	7,620,440	1,132,259
1944	208,086	18,329,918	130,032	18,668,036	18,818,738	1,217,615
1945	1,115,295	25,462,305	222,375	26,799,975	28,199,792	2,214,517
1946	11,086,542	54,684,036	652,643	66,423,221	66,466,319	1,763,472
1947	19,643,834	52,865,313	1,607,654	74,116,801	77,790,410	5,469,968

In 1942 the figures for original equipment and export shipments are distorted by the fact that during the year government restrictions required vehicle manufacturers to return excess stocks, and exporters to return some stocks originally intended for foreign customers. The inventory figures increased out of all proportion to production. This is due to the fact that dealers made large returns of stocks during the year to manufacturers and shipment figures were not adjusted for these returns.

Source:- Estimated by the Rubber Manufacturers Association.



# U. S. ROTARY WING AIRCRAFT

GEAR	.101	D nisM—bsorT	5, 101,4	12'0"	3,0,	8,0,	10, 0,	5, 10"	17' 6"	10,0,	12'0"	7'8"
30		Type	4(6)	표	TS	FF	ī	Ę	33	Ξ	77	E
		Service Ceiling— Mormal Load	11600	15000	1400		18800	1		10400	14000	12000
	9.0	Vertical (Ft./min.)	150	400	520	11	1000	1	::	200	100	400
	Rate of Climb	Maximum (Ft./min.)	925	1000	1900		1850	*	* *	930	800	1000
NNCE		Range (Miles) at Cruising Speed	212	95	950	300	348	20	11	285	280	210
ORM	("JU/q")	Cruising Speed (	09	162	88	:::	280	24	::	195	888	11
PERFORMANCE		Crusing Speed at	70+-5000	95-SL 75-SL	100-SL	80-SL 80-SL	90-SL 2		50-SL 70+-SL	91-2500	85-(d) 1 87-(e)	85-SL
	ebutitl	Max. Speed at A	40-11600 7	112-SL 95-SL	135-SL	100-SL 100-SL	121-SL	7S-+001	50+-SL 100+-SL 7	114-5000	103-(c) 95-SL	105-SL
40		Useful Load	677	1800	929	700	2793	214	300	1973	1250	747
WEIGHTS (Lb.)		Empty	1523	3600	1920	1600	8204	636	310	1927	3735	1353
W	(bso.	Gross (Normal L	2200	1070	2490	2300	1000	850	610	0069	1900	2100
	(3	Disc Area (Sq. F	25.3	* * *	50.2	: :	:	*	::	:	::	23.8
UE	1	Rotor R. P. M. al	1800	1 1	1200		:	1	::		1220	022
ANTI-TORQUE ROTOR	-	Blade Area (Sq. I	2.40		6.10	* *	:	:	11		11	2.30 1
ANTI	(Ft. In.)	Rotor Diameter (	ò ò		.0	6.6			6.5	-	00%	9
	86	Number of Blade	(1) (1)	11	ès es	No ne	No ne	No ne	No ne	No ne	က်တ်	2
	(*)	Disc Area (Sq. F	965	1810	1153	1286	3710	360	3324	:	::	935
	1	Rotor R. P. M. a. Cruising Speed	330	192	239		140	485	190		185	306
8		Type (If more the	Tan	CoA		n n	Int	Int	in it	Tan		* * * *
ROTOR	(.17	Blade Area (Sq.	35.3	21	72	11	296	32.4	7.6			100 000
MAIN	JC	Diameter of Roto (Ft. In.)	35, 115"	48'0"	38' 4"	38' 0"	65' 0"	.0 ,91	18, 0,,	41, 0"	32' 0"	34' 6"
		Blades per Rotor	0101	40	4	88	8	3	0 to	8	00 40	2
		Location	Gga	11	Cen	11	SS	Lab	SS	Tan	For	For
		Number Used		00	-	0101	2	2	-64	2		gree.
	.,	Rated Hp. at	178-3000	450-2300	228-3100	125-2600 190-2550	1050-2450	85-3300	450-	600-2250	450-2300	178-3000
N N		Number Used	32 1		- 6	. A	5 2	B -	200	1 0	2 h	54
ENGINE	P	Make and Mode	Frank 6V4-178-B32 Frank 6V4-178-B32	P&W-Wasp Jr ContC-100	Frank 0-405-9	Lyo. 0-290-3	ont R-975-15	Pobjoy	Own R185-AN-14B	P&WR-1340	P&W R-985-B4 Frank 6-ALV165-B13F	Frank6V4-178-B32
	("1	Oil Capacity (Ga	22	8	4.1 Fr	22	21,3 Cont.	11/4 Pc	;	8.5 P	P Fr	
	,,,	Octane Number Recommended	808	100	91	23	91 21	80	91 16	91 8	80 8	80 2
GENERAL	(,lsi	Fuel Capacity (G	33.3	8	75	32	180	6.5	200	100	100	27
GEN	1	Number of Seats	20	4-	2	0100	12	-	10	10	40	8
		A. T. C. Number		1 1	-	::					ev :	
	MAKE	MODEL	Bell (1) 47B	Bendix (2)J.	Doman-Frasier (3), LZ-1A	Kaman (4)K-190A	Kellett (5) XR-10	Landgraf (6)	McDonnell (7) 38	Piasecki (8) HRP-1	Sikorsky (9) S-51	United (10)UH-12

ABBREVIATIONS

A—Laterally disposed on center of gravity (4)—Quadrarycle with tail skid (c)—Sea level to 2300 ft. (d)—Sea level to 9500 ft.

(e)—Sea level to 5000 ft.

CoA-Central
CoA-Co-axial
Gla—Center line of engine aft of eabin
Font—Continental Motors Corp.

By A. F. Donovan and H. Hirsch Cornell Aeronautical Lab

dition where sudden rotor pitch

Frank—Franklin (Air-Cooled Motors)
Int—Inter-meshing
Lyb—Laterally spaced on booms
Lyb—Lycoming Motor
P&W—Pratt & Whitney Aircraft

Helicopter Controls for Pitch-Power Coordination

SL—Sea level
SS—Side by side
Tan—Tandem, fore and aft
Tri—Tricycle
TS—Tail skid

(1)—Bell Aircraft Corp.
(2)—Bendix Helicopter, Inc.
(3)—Doman-Frasier Helicopters, Inc.
(4)—Kaman Aircraft Corp.
(5)—Kellett Aircraft Corp.

(6)—Landgraf Helioopter Co. (7)—McDonnell Aircraft Corp. (8)—Pisseeki Helioopter Corp. (9)—Sikorsky Aircraft Div. (10)—United Helioopters, Inc.

only two pitch values and tend to cause serious over or under speeding at other pitches. linkages produce the proper pitch throttle relation at

Automatic servos to maintain constant rpm are slow, relatively inexpensive and still give good rotor easily added to the systems with good coordinating linkages. Servos for such application can be light, control. Servos for systems with poor or no mechanical coordination must be extremely fast and is given a difficult job of coordination for which past as a result, are usually heavy, complicated, and expensive. In event of servo failure in this case, the pilot reliance on the servo has given him negligible training. Heavy reliance on servo coordination, therefore, is inadvisable. speed

### linearizing the torque vs. throttle relation of the en-gine, makes possible direct interconnection of the two control systems at the main pitch-throttle control stick into a combined system for which the rotor rpm is plication beyond that required by independent pitch tems using only a single cam without a dead center the coordinated system can be designed so as to add negligible cost, weight and comand throttle control systems. Control coordinating syssubstantially unaffected by change in rotor pitch. Mechanically, changes without THE small amounts of inertia and high torque gerous changes in rotor rpm inside of something less Coordinated operation of the pitch loadings of helicopter rotors result in a concorresponding throttle adjustments will produce danthrottle controls, accordingly, is essential and

link were found to coordinate well at one speed to give inferior results away from the design condition. Unless

tremely sensitive to manual adjustments at high power settings. Systems which connect the pitch and throttle controls together without non-linear intermediate

the shape of the cam is compromised.

they are ex-

Clinto
Contin
Cushr
Gladd
Jacob
Lause
Mall
McC
Onae
Rote
Sals

han one second.

mechanical interconnection with provisions for manually or automatically adjusting the relative control settings is the most satisfactory approach to the prob-lem. Use of a dead-center bellcrank-link arrangement relation of the rotor, together with a cam for

torque

Lai Le On Un AE Af Ar AF BE BI BI CC CC CC DFI G

in the pitch system to linearize the parabolic pitch-



### SMALL GASOLINE POWER UNITS



			1	1		*	0	ENG	INE					NOR	Type	SYST			
MAKE AND MODEL	Use	Cycles		ders	Stroke	eme	Ratio	uo	Horsep	ower	£	_				-			pout
	Designed for	Number of C	Туре	No. of Cylinders	Bore and Str (In.)	Total Displacement (Cu. In.)	Compression (to-1)	Valve Location	Rated at RPM	Continuous at RPM	Torque—Lb. at RPM	Weight (Lb.)	Used	Туре	Ignition System	Туре	Make	Fuel Used	Starting Method
								All	R COOLED	ENGINES									
riggs & Stratton (1)!	Co.Ha.Pu.Af.Lm	4 4 4 4 4	Ver Ver Ver Ver Ver Ver	1 1 1 1 1 1 1 1	2x1½ 2x1½ 2x2 2x2 25/8x25/8 25/8x25/8 3x4¼	4.71 4.71 6.28 6.28 14.21 14.21 22.97	5.29 4.80 5.86 5.86 4.47 5.40 4.80		1.3-3600 1.0-3200 1.9-3600 1.3-3200 3.6-3200 5.1-3200 7.6-3200	1.1-3600 .85-3200 1.7-3600 1.1-3200 3.0-3200 4.3-3200 6.5-3200	1.9-3600 1.6-3200 2.8-3600 2.1-3200 5.9-3200 8.4-3200 12.5-3200	78	YYYY	Pn Pn Pn Pn Me Me Me	Mag Mag Mag Mag Mag Mag	Car Car Car Car Car Car	Own Own Own Own Own Own Own	9999999	HB HB PR HF HF
inton (2)	GS,Co,Ha,Pu,Re,Af GS,Co,Ha,Pu,Re,Af	4	Ver Ver	1	2x17/8 23/8x17/8	5.89 8.40	6.50 7.00	L	1.75-3600 3.0-3600	1.75-3600 3.0-3600	2.57-3600 4.38-3600	43 52		Ce Ce	Mag Mag	Car	T-Z T-Z	G	HE
ontinental (3)AA7	GS,Co,Ha,Pu,Re,Af	4	Ver	1	21/8×2	7.10	5.70	L	2.0-3400	2.0-3400	3.50-2400	401/2	Y	Me	Mag	Car	Til	G	PE
ushman (4)Husky M70 Husky M156 Husky M144	GS,Co,Ha,Pu,Re,Af GS,Co,Ha,Pu,Re,Af GS,Co,Ha,Pu,Re,Af	4 4 4	Ver Ver Ver	1 1 1	25/8×28/4 25/8×21/2 23/8×21/2	14.89 13.53 11.08	5.43 5.00 5.00	L	4.0-3600 2.0-1700 1.5-1600	3.5-2400 2.0-1700 1.5-1600	7.50-2400 6.0-1700 5.0-1600	70	Y	Fb Fb	Mag Mag Mag	Car Car Car	Til Til Til	G	He He
ladden (5) BB 49M AB 75 75M MC	GS,Co,Ha,Pu,Re,Af Marine	4 4 4 4 4	Ver Ver Ver Ver Ver	1 1 1 1 1 1	2½x3 2½x3 2¾x3 2½x3 2½x3 2½x3 2½x3	14.70 14.70 17.80 19.40 19.40 19.40	4.50 4.50 5.40 5.70 5.70 7.50		4.9-3200 4.9-3200 5.0-2600 7.0-3200 7.0-3200 9.0-4000	4.9-3200 4.9-3200 5.0-2600 7.0-3200 7.0-3200 7.0-3000	7.4-3200 7.4-3200 9.5-2500 11.8-3200 11.8-3200 12.3-3000	73 75 75 76	Y	Fb Av Fb Fb	Mag Mag Mag Mag Mag Mag	Car Car Car Car Car	MS MS MS MS MS	G,K G,K G,K G,K G,K	BI Hi BI BI Hi
cobson (6)J100	Lm Lm	2 2	Hor Hor	1	2x1½ 2¼x1¾	4.70 6.90	5.50 5.00		1.25-3000 1.65-3000	1.25-3000 1.65-3000	2.25-3000 3.00-3000			Av Av	Mag Mag	Car Car	Til	G	R
uson (7)LI RSC TLC PAC	GS GS,Co,Pu,Re GS,Co,Pu,Re	4 4 4	Ver Ver Ver	1 1 1 1	15/8x11/2 2x17/8 21/4x21/4 27/8x23/4	3.11 5.90 8.94 17.85	5.80 5.80 5.80 5.00	L	1.00-4400 1.50-3600 2.40-3200 4.90-2700	.85-4400 1.25-3600 2.00-3200 3.50-2700	1.20-4400 2.10-3600 3.95-3200 8.50-2700	33	Y	Fb Fb Fb	Mag Mag Mag Mag	Car Car Car	Til Til Til	GGGG	PPP
lall (8)7	cs	2	Ver	1	23/8×23/4	12.20	6.50		7.00-4250		8.65-4250	5	N		Mag	Car	Brk	G '	В
lcCulloch (9)1200H	CS Lm,Pu	2 2	Ver	1	2x2 2x2	6.28 6.28			3.70-4000 3.00-3500	2.8-3000 2.5-2500	5.30-3200 5.10-2500			Pn	Mag Mag	Car Car	Own	G	8
lovo (10)BA23	GS,Pu,Af,Hs,Co GS,Pu,Af,Hs,Co	4 4	Ver Ver	1	27/8×31/2 31/4×4	22.70 33.10			7.40-3200 8.50-2800	5.8-3000	15.2-1700 18.6-1600		Y	Fb Fb	Mag Mag	Car Car	Zen MS	G G	H
Onan (11)	GS GS,In In GS GS.In	4 4 4 4 4 4	Ver Ver Ver Ver Op	1	2x2 2½x2¼ 2½x2¼ 2¾x2¾ 2¾x2¾ 2¾x2¾ 2½x2¼ 3x2¾	6.28 8.95 11.05 16.30 16.30 22.10 38.80	5.00 6.23 4.10 4.80 6.23	L L L	.8-2100 1.4-2100 3.3-3000 3.45-2400 2.50-1800 6.70-3000 10.1-3000	.6-2100 1.0-1800 2.6-3000 2.7-2400 2.5-1800 5.3-3000 8.6-3000	6.0-300 7.1-240 7.3-180 12.0-300	10 5 0 12 0 17 0 17 0 8	5 Y Y Y Y Y	*********	Bat Mag BM Mag Mag BM BM	Car Car Car Car Car Car	Zen Zen Zen Zen Zen MS MS	G G G NgG NgG G	EETHEHH
Rototiller (12)	In	2	Ver	1	3x3½	23.00	6.10		5.0-2400	4.5-2000	14.5-135	0 20	4 N		Mag	Car	Til	G	B
Salsbury (13)600	majordi inti altrefi il	4	-	1	3x23/4	19.40	6.00	L	6.5-3200	5.25-3200	12.5-200	0 5	6 Y	Fb	Mag	Car	MS	G	F
Wisconsin (14)	GS,Co,Pu,Re,Af GS,Co,Ha,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af GS,Co,Pu,Re,Af	4 4 4 4 4 4 4 4 4 4	Ver Ver Ver Ver Ver Ver VI Vee Vee	1 1 1 1 1 1 2 2 4 4	3x31/4 31/4x4 31/2x4 35/6x4 3x31/4 31/4x31/4 31/4x31/4	13.50 13.50 17.80 17.80 23.00 23.00 33.20 38.50 41.30 45.90 53.90 91.90 107.7 154.0	5.6 4.6 5.1 4.9 5.3 4.6 4.6 4.8 4.5 4.8		3.0-2600 4.0-3200 6.1-2600 7.4-3200 7.2-2200 8.4-2200 11.2-2600 11.2-2600 22.0-2600 25.0-2400 31.0-2200	3.2-3200 3.2-2400 4.0-3200 6.3-3200 5.75-2200 7.4-2200 9.0-2600 17.6-2600 20.0-2400	7.1-320 9.3-170 10.2-310 11.0-200 14.1-240 19.8-140 24.2-140 25.8-130 32.0-160 32.0-160 56.2-160	0 77 0 77 0 15 0 15 0 21 0 21 0 22 0 22 0 22 0 22	5 Y	Ce	Mag Mag Mag Mag Mag Mag Mag Mag Mag Mag	Car Car Car Car Car Car Car Car Car Car	Zen Zen Zen	0000000000000000	
Cuchman (A)									TER COOL					-		24		OKN	
Cushman (4) Cub R14	0 GS.Co.Ha.Pu.Re.Af	4 4		1	31/2×41/2	37.33 43.29 49.70	4.1	0 L	2.0-600 3.0-700 4.0-800	2.0-600 3.0-700 4.0-800	18.4-600 22.5-700 28.4-800	2	95 Y 35 Y 45 Y	Fb		MV	Own	G,K,Ng	- 11
Lauson (7)PMN	astestinati atticita	4							5.5-300				25 Y					G	
Le Roi (15)	1 GS.Pu.Re.Af.In	4	VI	24	27/8x31/2 21/8x31/2	45.46 90.86	0 5.8		10.0-2000 21.3-2000 33.0-2300	17.0-200	0 60.0-15	00 4	00 Y 50 Y 30 Y	Fb	BM	CM	ZE	G,D,Ng G,D,Ng G,D,Ng	
Onan (11)W3M or		4		4	3½x45/8 3x23/4	140.0	1		33.0-230						BM		-	G,NgG	
Universal (16) AF To		4			3x21/4 2 3x31/2	49.5			5.0-120									G	

ABBREVIATIONS

"Cylinder 45° from horizontal
t—Weight includes generator
"Flyweights on camshaft
A—Auxiliary farm implement equipment
AM—Amal Av—Air Vane
Bat—Battery
BM—Battery and Magneto
Bp—Belt or Pulley Brk—Bracke
Car—Carburetor Ce—Centrifuga
CM—Carburetor or Mixing Valve
Co—Air Compressor CS—Chain Saws
D—Distillate ER—Electric or Rope
Fb—Flyball G—Gasoline
GS—Generator Sets

Ha—Home Appliances

HBP—Hand Crank-Pedal-Rope or Pulley

He—Hand Crank or Electric

Hor—Horizontal

HR—Hand Crank or Rope

Hs—Hoists I—In head

In—Industrial InM—Inboard Marine

K—Kerosene L—"L" Head

Lm—Lawn Mowers Mag—Magneto

Me—Mechanical

MS—Marvel-Schebler Carburetor Div.

MV—Mixing Valve

N—No or None Ng—Natural gas

NgG—Combination gas and gasoline

Op—Opposed
PB—Pedal or Belt or Pulley
Pe—Pedal PE—Pulley or Electric
Pl—Pulley Pn—Pneumatic Pu—Pumps
PR—Pedal or Rope Rc—Recoil
Re—Refrigerating equipment
Rr—Recoil or Rope
Str—Stromberg Carburetor Div.
Til—Tillotsen Mfg. Co.
Tr.Z—Tillotsen or Zenith Ver—Vertical
VI—Vertical in line Y—Yes
ZE—Zenith for carburetor, Ensign for
Mixing Valve
Zen—Zenith Carburetor Div.
(1)—Briggs & Stratton Corp.

(2)—Clinton Sales Co.
(3)—Continental Motors Corp.
(4)—Cushman Motor Works
(5)—Gladden Products Corp.
(6)—Jacobsen Mfg. Co.
(7)—The Lanson Company
(8)—Mall Tool Company
(9)—McCulloeh Motors Corp.
(10)—Novo Engine Company
(11)—D. W. Onan & Sons, Inc.
(12)—Fraser Farm Equipment Co.
(13)—Salsbury Motors, Inc.
(14)—Wisconsin Motor Corp.
(15)—Le Roi Company
(16)—Universal Motor Company



# AMERICAN G

				MAXII	E Hp.	In.									VAL	/ES			
				at Specifie	d R.P.M.	Cu.	Ratio	orque at Fr.) with or essories	-Type	per Half ylinders		Material	Max. I Diam (In	eter	Min. Diam (In	eter	Lif (In		Stem Diamet (In.)
	ENGINE MAKE AND MODEL	Designed for	Number of Cylinders, Bore and Stroke (In.)	With Bare Engine	With Standard Accessories	Piston Displacement	Compression R	Maximum Torque a R.P.M. (Lb. Ft.) wi without Accessories	Cylinder Liners	Crankcase Upper Half Integral with Cylinders	Arrangement	Exhaust Head S.A.E. No.)	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake
	Franklin	T,Tr,Ind	4-35 sx35 s	50-3000	43-3000	150.0	6.00	100-1200 (BE)	D	Se	1		1.66	1.51	1.50	1.40	.375	. 375	.375 .:
	Allis-Chalmers B-15 W-25 U-40 E-60 L-90	Tr,Ind Tr,Ind Tr,Ind Tr,Ind Tr,Ind	4-336x31/2 4-4x4 4-41/2x5 4-51/4x61/2 6-51/4x61/2	30-1800 44-1800 56-1400 81-1050 121-1050		125.2 201.1 318.1 562.8 844.3	5.00	87-1100 (EA) 128-1200 (EA) 200- 900 (EA) 400- 650 (EA) 590- 650 (EA)	W W W W	In In In In		Sil Sil Sil Sil	1.43 1.68 2.03 2.00 2.21	1.31 1.50 1.78 2.00 2.21	1.75	1.03 1.32 1.50 2.00 2.00	.378 .376 .375 .440 .440	.378 .376 .375 .417	.500
	Autocar	T T T	6-4x5 6-414x514 6-412x514	119-2800 145-2700 165-2700		447.0	5.85 6.00 6.00	292-1400 (BE) 352-1300 (BE) 402-1100 (BE)	N N N	Se Se Se	LLL	SilX10 SilX10 SilX10	1.90 2.12 2.12	1.78 1.93 1.93	1.68 1.93 1.93	1.56 1.79 1.79	. 406 . 452 . 452	.406 .452 .452	
	Brennan 20 Imp. De Luxe Spec. 75 Light Six M-4	Ind M T,In M	4-214x318 4-214x318 6-314x458 6-314x458 4-4x5	20-3900 25-4000 90-3500 95-3200 45-1800	15-3900 20-4000 75-3300 92-3200 38-1800	50.0 230.3 230.3 251.0	5.50	34-3200 (EA) 34-3200 (EA) 175-1000 (EA) 184-1250 155-1000 (EA)	N N N N	Se Se In In Se		Sil Sil Sil NCI	1.12 1.12 1.50 1.50	1.00 1.00 1.50 1.37	.875 .875 1.37 1.37	.875 .875 1.25 1.25	. 250 . 250 . 343 . 343	. 250 . 250 . 343 . 343	.312 .312 .312 .312
	CE E-4 B-70 100 B-100 125	M T,B,Tr,Ind M T,B,Tr,Ind M	4-41/2x5 4-41/2x5 6-4x51/2 6-4x51/2 6-43/8x51/2 6-43/8x51/2 6-41/2x61/2	54-1600 54-1600 90-2000 94-2000 94-2000 110-2200 150-2000	45-1600 75-2000 80-2000 80-2000 94-2200	318.0 415.0 415.0 496.0 496.0	5 00 5 00 4 50 6 00 4 50 6 00 6 00	203-1000 (EA) 203-1000 (EA) 278- 900 (EA) 278- 900 (EA) 350-1200 (EA) 500-1200 (EA)	N N N N N	Se Se Se Se Se Se	11	Sil Sil Sil Sil Sil Sil	2 00 2 12 2 12 2 12 2 12 2 12 2 50	2.12 2.12 2.12 2.12	1.87 2.00 2.00 2.00 2.00 2.00	1.87 1.87 2.00 2.00 2.00 2.00 2.12	.375 .375 .375 .375 .375 .375	.375 .375 .375 .375 .375 .375 .437	.375 .437 .437 .437 .437
Control of the Contro	Buda HP-326 HP-351 K-428 L-525 L0-525 JL-1335 FC-1879 FCG-1879 6-M0-870 6-M0-873 4-M0-645 4B-163 4B-163 6B-230 6B-273	T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind Ind Ind Ind Ind Ind T,Ind,M T,Ind,M Tr,Ind	6-3116x4346436x436x436x436x436x436x436x436x43	78-2400 84-2400 107-2400 113-2400 157-2400 164-1000 232-1000 340-1200 172-1400 199-2000 47-2800 54-2800 82-2800	66-2400 71-2400 95-2400 94-2400 140-1000 197-1000 310-1200 147-1400 170-2000 110-1400 42-2800 65-3000	326 0 351 0 428 0 525 0 525 0 1334 6 1879 0 1879 0 970 0 893 0 645 0 153 0 182 0 230 0	5.40 5.83 5.33 4.75 5.00 4.40 4.50	188-1000 (EA) 201-1000 (EA) 296-1100 (EA) 340-800 (EA) 396-1200 (EA) 780-600 (EA) 1110-750 (EA) 1200-750 (EA) 1410-950 (EA) 545-1000	N N N N N N N N N N N N N N N N N N N	In I		2112 2112 2112 2112 2112 2112 2112 211	1 65 1 65 1 90 1 90 1 96 2 93 2 71 2 71 2 71 2 64 2 64 1 50 1 50	1.53 1.78 1.78 1.68 2.93 2.53 2.53 2.53 2.02 2.02 2.02 1.28 1.28	1.50 1.50 1.75 1.75 1.75 2.50 2.50 2.50 2.37 2.37 2.37 1.37 1.37	1.37	.344 .344 .400 .400 .468 .438 .703 .703 .540 .540 .429 .429 .429	.344 .344 .400 .468 .438 .703 .703 .540 .540 .429 .429 .429	.372 .372 .372 .372 .372 .497 .558 .558 .433 .433 .437 .312 .312
Company of the Control of the Contro	Muffaio RA-4 RAB-4 RA-6 RAB-6 RA-8 RAB-8 RAB-8	M,Ind M,Ind M,Ind M,Ind Ind	4-57-8x7 4-61-2x7 6-57-8x7 6-61-2x7 6-57-8x7 8-61-2x7 12-61-2x7 16-61-2x7	120-1200 145-1200 180-1200 215-1200 240-1200 300-1200 430-1200 570-1200	130-1200 160-1200 195-1200 220-1200 270-1200 390-1200	929.0 1138.0 1393.0 1518.0 1858.0 2787.0	5.00 4.60 5.00 5.00	525-1200 (EA 635-1200 (EA 790-1200 (EA 955-1200 (EA 1050-1200 (EA 1275-1200 (EA 1910-1200 (EA 2550-1200 (EA	N N N N N N N N N N N N N N N N N N N	Se Se Se Se Se In	  -V  -V		3.09 3.09 3.09 3.09 3.09 3.09 2.46 2.46	2.84 2.84 2.84 2.84 2.84 2.25	2.87 2.87 2.87 2.87 2.87 2.87	2.62 2.62 2.62 2.62 2.62 2.62 2.00 2.00	.540 .625 .540 .625 .540 .625 .437	.540 .540 .540 .540 .540 .540 .437	.500 .500 .500 .500 .500 .500
	Chevrolet 1948 1948 - 1948 1948	COE T,B	6-39/6x315/6 6-39/6x315/6 6-31/2x33/4 6-31/2x33/4	90-3100 90-3300	83 . 5-3000 80-3000 81 . 5-3100 83-3200	235.5 216.5	6.62 6.62 6.50 6.50	179-1000 (EA)	N N N	In In In		AS AS AS	1.64 1.64 1.64 1.64	1.47				.312 .312 .312	.341
	Chris-Craft B W V K W T W K S MB	M M	4-314x4 6-376x418 6-4x414 6-414x434 6-376x418	**********	60-3200 95-3200 130-3000 160-3000 121-3800 145-3400	229.7 320.4 404.3 229.7	7.50 7.35 7.50 6.40 7.75 8.15	173-1800 (EA) 239-2400 (EA) 322-1500 (EA)	N N N N N N	In In In In In		CNS CNS Sil AUS CNS Sil	1.61	1.39 1.78 1.87 1.39	1.25 1.46 1.71 1.81 1.47 1.72	1.25 1.56 1.62 1.25	.312 .312 .356 .388 .312 .356	.312 .356 .388 .312	310 372 372 372 310
	Chrysler Ace-M16 Ace-M26 Crown-M17 Crown-M27 Floyal-M18 Royal-M18	M M M	6-314x438 6-314x438 6-316x412 6-316x412 8-314x478		92-3200 92-3200 115-3200 115-3200 141-3200 141-3200	217.7 250.6 250.6 323.5	6.60 6.60 6.80 6.80 6.80	205-1600 (EA 206-1600 (EA 268-1600 (EA	N N N N N	In In In In In		XCR XCR XCR XCR XCR XCR	1.72	1.41 1.53 1.53 1.35	1.28 1.28 1.43 1.43 1.40 1.40	1.28 1.37 1.37 1.22	.371 .371 .379 .379 .371	.369 .361 .361 .369	340 340 340 340 340
	Climax N4B R41 R61 R81 V-425 V-495 V-280 V-330	Ind Ind Ind Ind Ind Ind	4-53/4x61/2 4-6x7 6-6x7 8-6x7 12-61/2x7 12-7x7 8-61/2x7 8-7x7	102-1200 123-1200 183-1200 245-1200 425-1200 495-1200 280-1200 330-1200	112-1200 165-1200 221-1200 380-1200 445-1200 255-1200	791 6 1187 4 1583 2 2787 0 3232 0 1860 0	4.70 4.70 4.70 4.90 4.90	490- 700 (EA 525- 750 (EA 802- 700 (EA 1085- 750 (EA 2120- 750 2460- 750 1350- 800 1570- 800	N N N N W W W W W	In Se Se Se Se Se Se	1	Sil Sil CNS Sil Sil Sil Sil	2.50 2.50 2.50 2.50 2.81 2.81 2.81 2.81	2.50 2.50 2.50 2.68 2.68 2.69	2.25 2.25 2.25 2.50 2.50 2.50	2.25 2.25 2.25 2.37 2.37 2.37	.500 .500 .500 .687 .687	.500 .500 .500 .687	562 562 562 7 562 7 562 7 562
-	Continental N-62 Y-69 Y-4069 Y-91 Y-4091 Y-4091 Y-112	Ind Ind Tr Ind C.Tr	4-25/8x31/2 4-21/2x31/2 4-21/2x31/2 4-27/8x31/2 4-27/8x31/2 4-33/6x31/2	16-2200 20-2600 27-3000 28-2600 35-3000		62.0 68.7 68.7 90.9 90.9	5.40 4.90 6.70 4.50 6.10 5.90	43-1600 (BE 47-1400 (BE 51-2000 (BE 67-1400 (BE 70-1600 (BE	N N N	In In In In In		XCR Aus Aus Aus Aus	.895 1.20 1.20 1.20 1.20 1.20	. 895 1.01 1.01 1.01 1.01	.750 1.06 1.06 1.06	.750 .875 .875 .875 .875	.187 .296 .296 .296 .296	. 28	314 314 314 314

For abbreviations see pages 166 and 167

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Exhaust

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S



VAL	VES			PISTO	ONS	non		NECTI	ING			CRAN	(SH	AFT				CARB		(i)		VERAL	
Sea	its	Туре		Rings,	- fig	per Piston			ng .		Used	Crank- Pin	1	MAIN BEA	RINGS		nd Size			hout tion (Lb.)		(ln.)	
Inserts Used?	ert Material A.E. No.)	Camshaft Drive-T	Material	Weight with Pins, Bushings (Oz.)	Piston Pin— Diameter and Length (In.)	Number of Rings p	Material	Center to Center Length (In.)	Weight with Bushing and Cap (Oz.)	Material	Counter Balance U	Diameter and Length (In.)	Number	Diame Length	h (In.)	Pressure to	Spark Plug—Thread	Make	9:	Engine Weight without Carburetor or Ignition	Width	Height	Length
Ins	= S	Ca	Σ	Bu	Pisto Dian (In.)	ž	Σ	Ce	an	ž	3	L.	ž	Ē	Rear	lio	Sp	E	Size	₽2	*	ĭ	L.
Y	Nir	HG	Al	18	.859x3.12	4	1040	7	74	1045 1045	Y	1.93x1.00 1.93x1.43		2.25x1.22			14 mm	Op Zen	11/4	φφ 360	34	18½ 31½	18
NEERE	TA TA TA TA	HG HG HG HG	CI CI CI	42 67 99 162 162	.813x2.87 .989x3.50 1.31x4.06 1.50x4.87	5 4	1040 1045 1040 1040	6½ 7½ 9½ 13	42	1045 1045 1045 1045 1945	N N N	2.37x1.75 2.37x2.37 2.75x3.24 2.75x3.24	3 3 3 4	2.25x1.62 2.43x1.93 2.50x2.31 3.00x3.50 3.30x3.50	2.25x1.50 2.50x1.75 2.50x2.75 3.00x4.75 3.00x4.75	abcdeg abcdeg	14 mm 78-18 78-18 78-18	Zen Zen Zen Zen Zen(2)	1/8 11/4 11/2 11/2	520 985 2020 2810	16% 23 26 27 2934	313/8 371/2 477/8 633/16	27 33½ 43¾ 53 72½
mmm	71360 71360 71360	HG	AI AI	43 51 57	1.12x3.43 1.12x3.68 1.12x3.93	4	NE8640 NE8640 NE8640	1014	65 78 78	CS CS	YYY	2.37x1.44 2.50x1.53 2.50x1.58	7 7 7	3.25x1.87 3.25x1.87 3.25x1.87	3.25x2.60 3.25x2.87 3.25x2.87	abcde	18 mm 18 mm 18 mm	Zen Zen Hoi	1½ 1½ 1¾ 1¾	1230 1385 1395	27½ 27½ 27½ 27½	41 41½ 41½	45 47 47
N N Y E N N N N N N N N N N	TS TS	HG Ch Ch HG HG HG HG HG	AI AI AI CI SS SS SS SS SS SS	6 6 23 23 23 80 72 64 64 76 70 72	.625x2.00 .625x2.00 .875x2.75 .875x2.75 1.17x4.00 1.17x4.00 1.17x3.87 1.25x3.87 1.25x3.87 1.37x4.00	3 4 4 4 5 4 4 5 5 5	1045 1045 2320 2320 AS 1045 1045 CNS AS CNS	534 534 734 734 11 11 11 11 11	14 14 29 29 64 64 65 65 63 80	1045 1045 1045 1045 CNS 1045 1045 CNS CNS CNS CNS	YNYYNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN	1.31x1.25 1.31x1.25 2.06x1.25 2.06x1.25 2.56x2.00 2.50x2.50 2.50x2.00 2.50x2.00 2.50x2.00 2.50x2.00 2.50x2.00 2.50x2.00 2.50x2.00 2.50x2.00	3 3 4 4 3 3 3 3 3 3 3 7	2.50x1.50 2.50x1.87 2.50x1.87 2.12x4.25 2.50x4.25 2.50x4.25 2.75x4.50 2.75x4.50 2.75x4.50 2.75x4.50 2.62x5.00	2.50x1.50 2.50x1.50 2.50x1.75 2.50x1.75 2.12x2.25 2.50x3.50 2.75x3.00 2.75x3.00 2.75x3.00 2.75x3.00 2.75x3.00	abcde abce abcd abcde abcder abce abcdeg abce abcdeg	14 mm 14 mm 14 mm	Zen Zen Str	13/4 13/16 11/4 11/4 11/4 11/2 11/2 11/2 13/4	710 710 650 600 950	1234 1234 1834 1834 12716 21 16 2534 1934 20	175 8 175 8 22 22 191 2 293 4 18 333 4 243 4 333 4 243 4 30	1834 29 371/2 461/2 533/4 371/8 53 49 65 49 65 74
шшшшшшшшш	DC DC DC DC DC DC	HG HG HG HG HG HG	CI CI AI CI AI AIa AIa	42 42 68 88 88 199 263 263 263	1.12x3.25 1.12x3.25 1.25x3.82 1.25x3.81 1.25x3.81 2.00x5.33 2.75x5.53 2.75x5.53 2.75x5.53	4 4 5 4 5 5 5	CS CS CS CS AS AS CS CS	91/3 91/3 11 11 151/3 173/4 173/4	58 66 78 239 430 430	CS CS CS CS CS CS CS CS	N N N N N N Y Y	2.12x1.62 2.12x1.62 2.37x1.75 2.37x1.75 2.37x1.75 3.50x3.31 4.25x3.25 4.25x3.25 4.25x3.25	7777477	3.00x1.50 3.00x1.50 3.00x1.75 3.00x1.75 3.00x1.75 3.50x4.75 4.50x2.68 4.50x2.68	3.00x2.12 3.00x2.50 3.00x2.50 3.00x2.50 3.50x4.75 3.75x3.48 3.75x3.48	abcde abcde abcdeg abcde abcdeg abcdeg abcdeg	18 mm 18 mm 18 mm 18 mm 14 mm 7/8-18 18 mm 18 mm 18 mm	Zen Zen Zen Zen Zen Zen Zen Zen(2) Ens	11/2 11/2 13/4 13/4 2 2 2 2 2 2 2 1	885 905 905 950 1195 3700 9000 9000	2534 2534 2534 2534 2796 2858 48	331/6 331/6 3017/32 337/52 3827/32 43 485/16 685/16	39254 39254 47932 47932 493/8 74916 86532 88532
EENNN	Jad Jad Jad	HG HG HG HG HG	CI	152 152 152 152	1.75x4.75 1.75x4.75 1.75x4.75 1.00x2.84 1.00x3.09 1.00x	5 5 4 4 4	1040 1040 1040 CS CS 1045	121 121 121 73 73 73 73	171 171 171 171 171	1045 1045 1045 1045 1045 1045 1045	N N N N N N N	3.25x2.12 3.25x2.12 3.25x2.12 2.00x1.31 2.00x1.31 2.00x1.31	7 7 5 3 7	3.75x3.75 3.75x3.00 3.75x3.00 2.50x1.25 2.50x1.25 2.50x1.25 2.50x1.25	3.75x2.75 3.75x2.75 3.75x2.75 2.50x1.75 2.50x1.75 2.50x1.75	abcdeg abcdeg abcdeg abcdeg abcdeg abcdeg	14 mm 14 mm 14 mm 14 mm 14 mm 14 mm 14 mm	Zen Zen Zen Zen Zen Zen Zen	2 2 2 1 1 <sup>1</sup> / <sub>4</sub> 1	2400 2400 1925 500 520 625 635	4814 2814 30316 18316 18316 18316	581/8 481/4 481/4 267/8 267/8 267/8	581/8 581/8 447/8 303/6 303/6 389/6 389/6
<b>В</b> ВВВВВВВ	SA SA SA SA SA WM WM	HG HG HG HG HG	AI AI AI AI AI AI	132 154 132 154 132 154 171	1.50x5.62 1.68x6.25 1.50x5.62 1.68x6.25 1.50x5.62 1.68x6.25 2.00x5.87	5 5 5 5 5 5	3135 3135 3135 3135 3135 3140	14 14 14 14 14 14 14	147 147 147 147 147 147 147 173	3140 3140 3140 3140 3140 3140 4140 4140	Y Y Y Y Y Y	3.00x2.37 3.00x2.37 3.00x2.37 3.00x2.37 3.00x2.37 3.00x2.37 3.75x2.00	5 7 7 9 9	3.75x4.12 3.75x4.12	3.75x4.50 3.75x4.50 3.75x4.50 3.75x4.50 4.25x3.25	abe abe abe abe abe abeg	78-18 78-18 78-18 78-18 78-18 78-18 18 mm 18 mm	Zen Zen (2) Zen (2) Zen (2) Zen (2) Zen (3) Zen (4)	21/2 21/2 2 2 21/2 21/2 21/2 2	2500 2700 3000 3200 4000 4300 6200 8400	24 24 24 24 24 24 24 43 43	46 46 46 46 46 46 66	78 78 94 94 111 111 83 <sup>1</sup> / <sub>2</sub>
N N N		HG HG HG	ACI ACI ACI	40 <sup>3</sup> / <sub>4</sub> 40 <sup>3</sup> / <sub>4</sub> 33 <sup>3</sup> / <sub>4</sub> 33 <sup>3</sup> / <sub>4</sub>	.865x3.15 .865x3.15 .865x3.15 8.65x3.15	3	DFS DFS	613 <sub>1</sub>		DFS DFS	YYY	2.31x1.44 2.31x1.44 2.31x1.44 2.31x1.44	4	2.69x1.19 2.69x1.19 2.69x1.19 2.69x1.19	2.78x1.63	abeg	10 mm 10 mm 10 mm 10 mm	Car Car Car	11/4 11/6 11/4 11/4	608° 590°	21 21 21 21	293/4 293/4 293/4 293/4	39.1 39.1 39.1 39.1
N N N N N	St	HG HG HG HG	Alt Ala Ala Ala Ala Ala	21 25 36 44 25 36	.750x2.87 .875x2.87 1.00x3.50 1.12x3.68 .875x2.87 1.00x3.50	3 3 4 3	1040 3140 1035	691 7 8 87 7 8	40	1045 1045 1045 1045 1045 1045	NNNNNN	1.75x1.12 1.98x1.12 1.98x1.50 2.24x1.50 1.98x1.12 1.98x1.50	7 7 7 7	1.98x1.62 2.49x1.93 2.49x2.12 2.62x2.75 2.49x1.83 2.49x2.12	2.49x1.37 2.49x1.37 2.62x1.75	abr** abr abfr abfr	14 mm 14 mm 14 mm 14 mm 14 mm 14 mm	Zen Zen Zen Zen Zen (3) Zen (2)	11/4 13/8 13/4 2 11/2 2	850°	24 <sup>1</sup> / <sub>8</sub> 24 <sup>1</sup> / <sub>8</sub> 26 <sup>5</sup> / <sub>16</sub> 26 <sup>7</sup> / <sub>8</sub> 24 <sup>1</sup> 5/ <sub>16</sub> 26 <sup>5</sup> / <sub>16</sub>	231/16 251/2 279/2 299/16 319/16 279/2	40
шшшшшш	CMT CMT CMT CMT CMT	HG Ch	AI AI AI AI AI	****	.859x2.73	3 4 4 3 4	1335 1335 1335 1335	7.93 7.93 7.87 7.87 8.99 8.99	3	1040 1040 1040 1040 1040 1040	Y Y Y Y Y	2.06x1.24 2.06x1.24 2.12x1.37 2.12x1.37 2.18x1.37 2.18x1.37	4 4 5	2.50x1.44 2.50x1.44 2.50x1.59 2.50x1.59 2.70x1.78 2.70x1.78	2.50x1.87 2.50x1.87 2.50x1.87 2.70x2.09	abce abce abce	14 mm 14 mm 14 mm 14 mm 14 mm 14 mm	Zen Zen Zen Zen Zen Zen	11/4 11/4 11/2 1 13/4 13/4			245/8 245/8 251/8 251/8 261/8	46 <sup>25</sup> 43 <sup>31</sup> 49 <sup>1</sup> / <sub>3</sub> 46 <sup>7</sup> / <sub>3</sub> 58 <sup>1</sup> / <sub>4</sub> 54 <sup>7</sup> / <sub>3</sub>
шшшшшшш	CI CI CI CI NCI NCI NCI	HG HG HG HG HG	CI AI AI AI AI AI	189 153 153 153 165 176 165 176	1.48x5.25 1.49x5.37 1.49x5.37 1.49x5.37 2.00x5.75 2.00x5.75 2.00x5.75 2.00x5.75	7 4 7 4 5 5 5 5 5 5	3135 3135 3135 3135 3135 3135	14 16 16 16 16 16 16	194 244 244 276 276 276 276	1045 4140 4140 4140 4140 4140 4140 4140	NNYNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN	3.00x3.00 3.00x3.50 3.00x3.50 3.37x3.18 4.00x5.00 4.00x5.00 4.00x5.00	3 4 5 7 7 5	3.25×3.50 3.25×3.81 3.25×3.81 4.00×3.62 4.50×3.75 4.50×3.75 4.50×3.75	3.25x4.50 3.25x4.50 4.00x4.50 4.50x5.50 4.50x5.50	abceg abceg abceg abcdeg abcdeg abcdeg	78-18 78-18 78-18 78-18 18 mm 18 mm 18 mm	Zen Zen Zen(2) Zen(2) Zen(4) Zen(4) Zen(2) Zen(2)	2 2 2 2	2300	30½ 31¾ 29½ 35¾ 51 51 51	46 49 ½ 51 ¾ 56 13 16 55 55 58 58	7315
N N N N N N N		HG HG			.546x1.90 .703x2.00 .703x2.00 .703x2.4 .703x2.4	0 3 6 3 4 3 4 3	1030 1030 1030 1030	53	4	DFS DFS DFS DFS DFS	N N N N N	1.50x1.18 1.50x1.18 1.50x1.18 1.50x1.18 1.50x1.18	3 3 3 3 3	1.75x1.3 1.75x1.3 1.75x1.3	7 1.75x1.78	B abcet B abcet B abcet B abcet	18 mm 18 mm 18 mm 18 mm 18 mm 18 mm		1 1	170 265 290 265 290 265	16 26 26 26 26 28 28	19 22 <sup>15</sup> / <sub>1</sub> 22 <sup>15</sup> / <sub>2</sub> 22 <sup>15</sup> / <sub>1</sub> 22 <sup>15</sup> / <sub>1</sub>	251 251 251

For abbreviations see pages 166 and 167

			MAXII BRAKI	E Hp.	In.)					-				VAL	VES				
			at Specifie	d R.P.M.	Cu.	0	e at with or ies	-Type	er Haif nders		Material	Max. Diam (In	eter	Min. Diam (In	eter	Lif (In		Ste Dian (In	eter
ENGINE MAKE AND MODEL	Designed for	Number of Cylinders,	With Bare Engine	With Standard Accessories	Piston Displacement	Compression Ratio	Maximum Torqne R.P.M. (Lb. Ft.) w without Accessorie	Cylinder Liners—Type	Crankcase—Upper Half Integral with Cylinders	Arrangement	(S.A.E. No.)	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust
Continental, Conl. Y-4112 F-124 F-4124 G-134 F-140 F-4140 G-147 F-162 F-162 F-4162 H-227 H-243 F-186 F-6186 F-629 F-631 R-6513	Ind C,T,Tr Ind C,T,Tr Ind C,T,Tr Ind C,T,Tr Ind Ind Ind Ind Ind C,T,Tr Ind T,B,Tr Ind	4-31,4x31,2 4-3x43,6 4-3x43,6 4-31,6x43,6 4-31,6x43,6 4-31,6x43,6 4-31,6x43,6 4-31,6x43,6 4-31,6x43,6 6-3x43,6 6-4x4	45-3000 36-2400 46-3000 33-2400 42-2400 52-3000 54-2000 55-3000 54-2400 59-3000 61-2400 70-3000 661-2200 89-2200 89-2200 89-2200 100-2600 112-2200 112-2200 112-2500 1139-2500 1164-2000 1189-2500 1199-2500 1199-2500 1247-2600		111 7 7 123	4.10 6.50 6.30 4.80 4.80 6.10 4.70 6.10 4.20 6.10 4.20 6.10 6.00 4.40 6.10 5.90 6.10 5.90 6.10 5.90 6.10 5.90 6.10 6.10 6.10 6.10 6.10 6.10 6.10 6.1	86-2200 (BE) 91-1200 (BE) 86-1400 (BE) 104-1000 (BE) 121-1000 (BE) 121-1000 (BE) 121-1000 (BE) 122-1600 (BE) 122-1600 (BE) 139-1000 (BE) 139-1000 (BE) 155-1000 (BE) 155-1000 (BE) 155-1000 (BE) 155-1000 (BE) 168-1000 (BE) 168-10000 (BE) 168-10	222522522552222222222222222222222222222			Aus Aus Aus Aus Aus XCR Aus XCR Aus XCR Aus XCR Aus	1.20 1.51 1.51 1.51 1.51 1.51 1.51 1.51 1.5	1, 32 1, 32 1, 32 1, 20 1, 32 1, 20 1, 32 1, 32 1, 45 1, 32 1, 32	1.37 1.37 1.18 1.37 1.18 1.37 1.50 1.37 1.50 1.37 1.50 1.37 1.50 1.37 1.37 1.37 1.37 1.37 1.37 1.37 1.37	. 875 1.18 1.18 1.09 1.18 1.09 1.18 1.18 1.18 1.18 1.31 1.18 1.31 1.31	. 296 . 281 . 281 . 281 . 281 . 281 . 281 . 343 . 359 . 359 . 359 . 359 . 375 . 421 . 500 . 500	281 281 281 312 281 312 281 343 343 296 281 359 343 359 343 359 343 359 375 359 375 359 375 359 375 359 375 359 369 375 359 369 375 375 375 375 375 375 375 375 375 375	.314 .341 .343 .343 .343 .341 .343 .341 .341	333333333333333333333333333333333333333
Dodge T-142, T-144 T-146 T-137 T-148, TX-148, T-152, TX-152 T-150, TX-150, T-154, TX-154 T-156 T-158, TX-158	T T T	6-314x438 6-314x458 6-314x458 6-316x414 6-316x414 6-334x414	114-3600	82-3200 74-2800 89.5-3200 97.5-3200 106-3200	217.8 230.2 230.2 236.6 250.6 281.6 331.3	6.70 6.70 6.60 6.60 6.40	172-1200 (BE) 184-1200 (BE) 185-1200 (BE) 192-1200 (BE) 204-1200 (BE) 225-1200 (BE) 270-1200 (BE)	N N N N N	In In In In In In		Sil Sil Sil Sil(x) Sil(x) Sil(x)	1.53 1.53 1.53 1.72 1.72 1.94 1.94	1.41 1.41 1.53 1.53	1.41 1.41 1.56 1.56 1.78	1.28 1.28 1.28 1.37 1.37 1.59 1.59	.380 .380 .380 .380 .380 .410 .410	.380 .380 .380 .380 .380 .380	.340	0
Fageol Marine ***FM-200 Ford		6-41/4x43/4 6-3.30x4.40	95-3600	200-3200	404 226.0	8.50 6.80	400-2200 (EA) 180-1200 (BE)	D	In In	L	Sil	1.77			1.50	.375	. 375		
B99A G. M. C. 228 248 270 308 361 426 426	C,T,B T T T T T T T T	8-3½x3¾ 6-3½x3½6 6-3½x3½6 6-3½x4 6-3½x4 6-4½x4½ 6-4½x5	100-3800 95-3200 100-3100 104-3000 122-3200 136-3000 145-2600 154-2600	89-3600 85-3000 89-3000 95-3000 100-2800 115-2800 127-2400	239.4 228.0 248.5 269.5 308.2 360.8 425.6	6.80 6.75 6.75 6.75	180-2000 (BE) 183-1000 (BE) 202-1000 (BE) 222-1000 (BE) 241-1000 (BE) 273-1000 (BE) 345-1000 (BE)	N N N N N	In In In Se Se Se Se	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CNS CNS CNS CNS CNS CNS CNS	1.50 1.64 1.64 1.64 1.81 1.94 1.94	1.50 1.43 1.43 1.43 1.56	1.34 1.31 1.31 1.31 1.44 1.50 1.50	1.34 1.16 1.16 1.37 1.50 1.50	. 292 . 323 . 323	.331	.31 .34 .34 .37 .37	1 . 1 . 1 . 2 . 2 . 2 .
Gray Marine Light Four-69 Sea Scout-91 4-162 6-226 6-244 6-326 6-427 4-162 6-236 6-427 6-330 6-427 6-330 6-427 6-330 6-427 6-104 6-104 6-125 6-104 6-126 6-126 6-144 6-150 6-150 6-150	M M M M M M M M M M M M M M M M M M M	4-21-xx31-2 4-21-xx31-2 4-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-4-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-4-10-xx41-3 6-4-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-10-xx41-3 6-3-3-10-xx4		93-3200 102-3200 124-3200 150-3200 145-3200 45-3600 75-3600 104-3600 125-3600 50-4000 90-4000 140-4000 150-4000 160-4000 180-5000	226 244 330 427 162 224 330 427 330 427 91 162 226 244 91 162 244 244 244 244 225	6.75 6.22 6.00 5.93 6.00 6.75 6.5 6.73 7.45 7.00 6.75 6.9 7.45 8.00 7.7		N N N N N N N N N N N N N N N N N N N	In I		Sill Sill Sill Sill Sill Sill Sill Sill	1 . 20 1 . 51 1 . 51 1 . 51 1 . 70 1 . 76 1 . 89 1 . 51 1 . 70 1 . 89 1 . 20 1 . 64 1 . 51 1 . 70 1 . 20 1 . 70 1 . 70	1 .33 1 .42 1 .51 1 .64 1 .33 1 .42 1 .515 1 .64 1 .515 1 .42 1 .45 1 .42 1 .52 1 .53 1 .42 1 .53 1 .53 1 .42 1 .53 1 .53 1 .42 1 .53 1 .5	1.06 1.37 1.37 1.56 1.62 1.75 1.37 1.56 1.62 1.75 1.06 1.37 1.37 1.37 1.43 1.43 1.43 1.43	. 875 1 . 18 1 . 31 1 . 37 1 . 5 1 . 18 1 . 31 1 . 37 1 . 5 . 875 1 . 18 1 . 31 1 . 31	. 284 . 284 . 331 . 339 . 359 . 359 . 354 . 359 . 354 . 331 . 311 . 284 . 331 . 360 . 360	.359 .284 .331 .311 .284 .331 .360 .360 .284 .360	311 344 344 400 433 440 433 440 433 440 433 440 433 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 443 440 440	4
Hall-Scott (H) 136	T,B,FA T,B B B Tr,In Tr,In Tr,In Tr,In Tr,In Tr,In Tr,In	6-41/xx5 6-41/xx5 6-41/xx5 6-5x6 6-5x4 6-5x6 6-5x6 6-5x6 6-5x6 6-5x4 6-5x6 6-5x4 7 6-5x7 6-5x7 8-5x7 12-5x4 7 12-5x4 7 12-5x4 7 12-5x4 7	130-3000 145-2800 159-2600 208-2200 220-2200 235-2200 245-2100 266-2100 286-1800	107-2800 122-2800 136-2600 193-2200 200-2200 215-2200 260-1800 252-2100 605-2100 630-2100	477.1 477 707.0 779.0 779.0 855 935 1090.0 997.8 997.8 2181.0	5.50 6.50 6.00 5.60 5.70 5.70 5.70 5.70 7.00	340-1000 (BE 380-1600 (BE 540-1500 (BE 625-1300 (BE 640-1400 (BE 660-1600 (BE 760-1400 (BE 885-1200 (BE	W W W W W N N N N N N N N N N N N N N N	In I		2112 2112 AESW 2112 2112 2112 AESW 2112 2112 2112 2112 2112 2112 2112	2.63 2.63 2.63 2.62 2.87 2.87 2.87 2.87 2.87	2.16 2.02 2.38 2.38 2.38 2.37 2.37 2.75 7.2.75 7.2.75 7.2.75	2.12 2.00 2.38 2.38 2.37 2.37 2.62 2.62 2.62 2.62	1,90 1,75 2,02 2,02 2,02 2,02 2,02 2,50 2,62 2,50 2,50	.506 .482 .482 .482 .547 .547 .482 .482 .482 .482	. 482 . 482 . 547 . 547 . 482 . 482 . 482 . 482	43 43 49 49 49 49 49 49 49 49 49 49 49 49 49	35 35 35 37 97 97 97 97 97 97

ALVI	ES		-		PIS	TONS	S	u	CONN	ECTI ODS	ING		i	1	CRAN	-						RI	RBU-		 D	DIM	ERALL ENSIO (In.)	NS	
Seat	s		Турв		Rings,		gth	per Piston			ushing		Used	-	Pin	N			er and		Thread Size			1	without Ignition (Lb.)				
Inserts Used?	Insert Material	3	Camshaft Drive—	Material	Weight with Pins,	Bushings (Oz.)	Piston Pin- Diameter and Length (In.)	Number of Rings	Material	Center to Center Length (In.)	with B	Material	Counter Balance		Diameter and Length (In.)	Number		Length	Rear (Iu.)	Oil Pressure to-	Spark Plug-Thr	2	Make		Engine Weight v	Width	Height	Length	I a face Manusham
NNNNNNNEENNNNNEEEEEEEEEEEEEEEE	Sissississississississississississississ	A A A A A A A A A A A A A A A A A A A	HGGHGGHGGHGGHGGHGGHGGHGGHGGHGGHGGHGGHGG	AI AI AI AI AI AI AI AI AI	aa aa aa aa aa aa aa		703x2.75 859x2.50 859x2.50 859x2.50 859x2.68 859x2.68 859x2.68 859x2.67 859x2.87 859x2.87 859x2.87 1.25x3.31 1.25x3.31 8.859x2.50 8.859x2.50 8.859x2.61 1.10x3.01 1.10x3.41 1.10	444444444444464646575575445555555555555	103! 103! 864!	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	/2	DF DF DF	NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN	11 11 11 11 11 11 11 11 11 11 11 11 11	.50x1.18 .93x1.31 .93x1.31 .93x1.31 .93x1.31 .93x1.31 .93x1.31 .93x1.31 .25x1.18 .25x1.18 .25x1.13 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .20x1.31 .33x1.31 .33x1.31 .93	777777777777777777777777777777777777777	2.255.225.23.2.22.2.23.2.2.22.2.2.2.2.2.	x1.28 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.18 x1.25 x1.18 x1.53 x1.18 x1.53 x1.18 x1.53 x1.18 x1.53 x1.18 x1	2.37x1.88 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.89 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.81 2.25x1.82 2.25x1.82 2.25x1.83 2.37x1.8	abcet	18 m 18 m 18 m 18 m 18 m 18 m 18 m 18 m			111111111111111111111111111111111111111	290 370 395 475 395 475 395 475 395 644 654 506 515 506 515 720 755 772 772 772 772 772 772 772 772 772	26 26 1615/2 26 1615/2 26 1615/2 26 1615/2 26 26 1615/2 26 26 26 26 26 26 26 26 26 26 26 26 26			22.22.22
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(h) (h) (k)	N			G G G G G G G G G G G G G G G G G G G	CI AI AI AI AI AI AI AI AI AI AI AI AI		.859x2 .859x2 .859x3 1.10x3 1.25x3 .859x3 .859x3 .859x3 1.10x3 1.25x3 1.25x3 7.03x3 .859x3 .850x3 .850x3 .850x3 .850x3 .850x3 .850x3 .850x3 .850x3 .8	2.69 2.81 2.87 3.43 3.63 3.63 2.268 2.81 2.87 3.43 3.63 3.63 3.43 3.63 2.268 2.81 2.87 2.87 2.87 2.87 2.87	4 C 4 C 4 C 4 C 4 C 4 C 4 C 6 C 6 C 6 C		83 8 83 8 83 8 83 8 83 8 83 8 83 8 83	1	045 045 045 045 045 045 045 045 045 1045 1	YYY	1.93x1 2.12x1 2.12x1 2.12x1 1.51x1 2.12x	.18 .31 .31 .37 .56 .68 .31 .37 .56 .68 .31 .37 .18 .31 .37 .18 .31 .37 .18 .31 .37 .18 .31 .37	33444777344477773344443344443344	1.75x8 1.75x1 2.25x1 2.25x1 2.37x2 2.62x2 2.25x2 2.25x2 2.25x2 2.25x2 2.25x2 2.25x2 2.62x2 2.87x2 2.62x2 2.25x2 2.	.78 1.75x .73 2.25x .73 2.25x .206 2.37x .15 2.62x .71 2.87x .73 2.25x .73 2.25x .73 2.25x .73 2.25x .25x .25x .25x .25x .25x .25x .25x	1.37 abci. 1.18 abci. 1.28 abci. 1.28 abci. 1.56 abci. 1.56 abci. 1.18 abci. 1.28 abci. 1.28 abci. 1.43 abci. 1.56 abci. 1.57 abci. 1.58 abci. 1.58 abci. 1.43 abci. 1.43 abci. 1.43 abci. 1.43 abci. 1.43 abci.	14 18 18 18 18 18 18 18 18 18 18 18 18 18	mm	Zen Zen Zen Zen Zen Zen ST Zen Zen St St Zen	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3914 566 569 34 107 34 125 34 125 34 120 34 120 34 120 34 120 34 36 56 57 34 36 34 36 57 34 36 34 36 3	0 173 193 5 193 5 23 0 244 0 255 5 193 5 21 190 255 217 0 25 25 260 25 25 27 20 25 27 27 28 29 20 25 21 21 21 22 23 24 24 25 25 21 21 21 22 23 24 25 25 25 21 21 21 21 22 23 24 25 25 24 25 25 27 27 27 27 27 27 27 27 27 27	221 6 6 223 6 225	29 35 35 36 43 35 44 44 49 66 53 36 42 36 45 36	13/4 13/4 13/4 13/4 13/4 13/4 13/4 13/4
30 30 (h) (h) (h) (h) (h) 30 30 30 30	<b>МИМИМИМИМИМИМ</b>	CA CA 414 414 414 414 416 416 CA	10° (10° (10° (10° (10° (10° (10° (10° (	Ch Ch Ch Ch Ch Ch Ch HC Ch HC	AI AI AI AI AI AI AI AI	5: 55 55 9 10 10 11 13 12 10 10 12 12	6 1.125 3 1.125 6 1.37; 1 1.87; 6 1.37; 12 1.37; 12 1.37; 10 1.37; 10 1.37; 10 1.37; 10 1.37; 10 1.37; 10 1.37; 11 1.37; 11 1.37; 11 1.37; 12 1.37; 12 1.37; 13 1.37; 14 1.37; 15 1.37; 16 1.37; 17 1.37; 17 1.37; 18 1.37;	(3.74 (3.58 (3.98 (4.20 (4.44 (4.46 (4.68 (4.93 (4.93 (4.94 (4.94 (4.94	4 4 3 4 3 6 3 6 5 5 5 6 5 5 6 6 6 6 6 6 6 6 6 6	S S 135 135 135 140 140 140 15 140 140 140 140 140 140	11 11 11 6 11 6		4140 4140 4140 4140 4140 4140 4140 4140	YY	2.62x 2.62x 2.75x 2.75x 2.75x 3.00x 3.00x 2.50x 2.50x 4 2.50x 4 3.00x	2.00 2.44 2.44 2.44 2.44 2.44 2.44 2.44	0 7 0 7 4 7 4 7 4 7 3 7 3 7 5 7 5 7 3 7	3.25 3.25 3.25 3.25 2.75 2.75 3.25 3.25	(1.50) 3.00: (1.46) 3.00: (2.19) 3.25: (2.19) 3.25: (2.09) 3.25: (2	x2.25 ab x2.28 ab x2.50 ab x2.50 ab x3.12 ab x3.12 ab x3.12 ab x1.94 ab x1.94 ab x2.09 ab	cefg 1: cef 1: cefg 1: cefgr 1: cefgr 1: cefgr 1:	8 mm 8 mm 8 mm 8 mm 8 mm 8 mm 8 mm 8 mm	Zen Zen Zen		134 12 134 12 2 17 2 17 2 17 2 17 2 19 2 21 2 21 2 21 2 21 2 32 2 21 2 42 2 33	65° 5493 5086 5486 5486 5486 5486 5486 5486 5486 54	19/6 21 19/6 2 19/6 2 19/6 2 19/6 2 19/6 2 19/6 2 19/6 3 19/6 3 1	37/6   5 101/6   5 22 77 72 77 77 84 84 85 86 87 87 87 87 87 87 87 87 87 87	527 527 531 711 711 809 809 809 74 888 91

IES

### American Gasoline

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			MAXII BRAKI	E Hp.	(n.)									VAL	VES			
ENGINE MAKE		f Cylinders, Stroke (In.)	at Specifie	d R.P.M.	Cu.	Ratio	que at t.) with or ories	Туре	per Half /linders		Material	Max. Diame	ter	Min, Diam (In	eter	Lif (In		Stem Diamete (In.)
AND MODEL	Designed for	Number of Cyli Bore and Strok	With Bare Engine	With Standard Accessories	Piston Displacement	Compression Ra	Maximum Torque a R.P.M. (Lb. Ft.) wi without Accessories	Cylinder Liners	Crankcase Upper Integral with Cylin	Arrangement	Exhaust Head (S.A.E. No.)	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake
Hercules BXB  NXA  NXB  ZXB  IXA  IXA  QXA  QXA  QXC  QXLO  JXC  JXC  JXC  JXC  JXC  JXC  TDXB  RXC  RXLC  RXLD  RXLDH  HXB  HXC  HXD  HXD  HXD  HXD  HXD  HXD  HXD	M.Tr.Ind M.Tr.Ind M.T.Tr.Ind T.Tr.M.Ind T.Tr.M.Ind T.Tr.M.Ind T.B.Tr.M.Ind	6-31,x41, 6-31,x41, 6-31,x41, 6-31,x41, 6-35,x41, 6-35,x41, 6-35,x41, 6-4x41, 6-4x41, 6-4x41, 6-4x41, 6-41,x41, 6-41,x41, 6-41,x41, 6-41,x41, 6-42,x51, 6-43,x51, 6-43,x51, 6-43,x51, 6-43,x51, 6-43,x51, 6-43,x51, 6-5x6, 6-5x6,	69-3200 77.5-3200 91-3200 91-3200 98-3200	11-2000 13-2000 13-2000 21-3800 34-3200 40-3200 559-3200 66-3200 77-3200 83-3200 77-3200 83-3200 111-3200 111-3200 118-2600 118-2600 118-2600 135-2600 135-2000 149-2000 149-2000	56. 5 66. 3 58. 8 64. 9 113. 0 133. 0 133. 0 133. 0 205. 0 2221. 0 2236. 7 245. 0 282. 0 320. 0 320. 0 339. 0 404. 0 501. 0 501. 0 502. 2 474. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0 558. 0	6 50 6 50 6 50 6 50 6 50 6 50 6 60 6 60	28-1200 (BE) 39-1100 (BE) 46-1101 (BE) 46-1101 (BE) 37-1800 (BE) 39-1800 (BE) 79-2000 (BE) 132-1300 (BE) 132-1300 (BE) 132-1300 (BE) 159-4000 (BE) 159-4000 (BE) 184-1400 (BE) 190-1400 (BE) 270-1400 (BE) 270-1400 (BE) 270-1400 (BE) 270-1400 (BE) 270-1400 (BE) 310-1200 (BE) 310-1200 (BE) 350-1200 (BE) 350-1200 (BE) 366-1400 (BE) 408-1100 (BE) 408-1100 (BE) 408-1100 (BE) 555-900 (BE) 555-900 (BE) 545-900 (BE)	N N N N N N N N N N N N N N N N N N N	In I		AUS	1 30 1 48 1 30 1 48 1 30 1 48 1 48 1 48 1 68 1 68 1 68 1 68 2 00 2 00 2 00 2 00 2 00 2 00 2 00 2 0	1 .05 1 .35 1 .05 1 .05 1 .05 1 .35 1 .35 1 .39 1 .39 1 .56 1 .56 1 .56 1 .56 2 .00 2 .00	1 12 25 1 25 1 25 1 25 1 25 1 25 1 25 1	1.62 1.75 1.75 1.75 1.75 1.75 1.75 2.00 2.00 2.00	200 250 250 250 250 250 250 250 311 311 356 359 358 388 388 388 388 442 468 468 468	200 250 250 200 250 250 250 311 311 311 315 356 356 388 388 388 388 388 468 468 468 468	.373 .373 .435
International U-2 U-4 U-6 U-9 GRD-214 GRD-233 BLD-250 BLD-259 RED-361 RED-450	Tr,Ind Tr,Ind T T T T,B,Ind T,B,Ind T,B,Ind	4-3x4 4-3%x5\4 4-4.4x5\2 6-3\6x4\2 6-3\6x4\2 6-3\6x4\2 6-3\6x4\2 6-4\6x4\2 6-4\6x5	24.5-1800 33.5-1800 43-1500 56.5-1500 82.4-3400 93.3400 99.8-3200 100-3000 126-2800 140-2800 148-2600	55-1500 73-3200 80-3400 84-3000 89-2800 112-2800 126-2800	152.1 247.7 334.5 232.6 250.5 269.1 360.8 400.9	5.65 5.40 6.30 6.30 6.30 6.30 6.30	78-1000 (EA) 108-1250 (EA) 162- 900 (EA) 227-1000 (EA) 158-1000 (EA) 176- 800 (EA) 194- 800 (EA) 216-1000 (EA) 278-1000 (EA) 314-1000 (EA) 348-1000 (EA)	WODDNIGODDD	In I		CNS CNS CNS CNS SII XCR XCR XCR XCR XCR	1.34 1.50 1.81 2.09 1.68 1.65 1.65 2.25 2.25 2.25	1.22 1.37 1.66 1.91 1.43 1.44 1.46 1.47 1.62 1.54	1.19 1.34 1.59 1.87 1.50 1.50 1.50 2.00 2.00 2.00	1.44 1.69 1.28 1.28 1.31 1.31 1.37	. 261 . 343 . 438 . 469 . 320 . 320 . 332 . 332 . 449 . 449	. 261 . 343 . 438 . 469 . 320 . 320 . 332 . 449 . 449	.372
Kermath ZX	M	4-25 x3 4-35 x438 4-31 x338 6-38 x418 6-44 x434 6-5x534 12-51 x6	**********	25-3400 40-2700 61-3600 95-3600 122-3000 155-3000 200-2400 550-2400	134.0 134.0 221.0 320.0 404.0 678.0	6.48 6.50 6.90 6.50 5.70	40-1700 (EA) 106-2200 (EA) 106-2200 (EA) 235-2000 (EA) 480-1000 (EA) 1070-1400 (EA)	N N N N N N	In In In In In Se Se		Sil CNS CNS CNS CNS	1.25 1.53 1.53 1.87 1.84 2.06 2.62 1.93		1.12 1.34 1.34 1.81 1.62 1.81 2.40 1.76	1.28 1.81 1.37 1.62 2.00	. 250 . 359 . 359 . 281 . 376 . 500 . 437 . 375	. 250 . 359 . 359 . 281 . 376 . 500 . 375 . 375	.437
Lathrop Standard Standard LH Standard Standard Engineers Engineers LH De Luxe LH-D6 Mystic Mystic Mystic Mystic Engineers Engineers	M M M M M M	3-5-16x6-2 3-5-16x6-2 4-5-16x6-2 4-5-16x6-2 4-5-16x7 6-33-4x4-4 6-47-245-2 6-4-245-2 6-5-5-2x6-2 6-5-6x7	115- 925	27- 700 34- 800 38-2200 29- 700 49- 800 64-1000 76-1000 107-2500 96-1600 106-1600 179-1600 118-1000	133.0 549.5 617.7 665.2 791.6 282.0 320.0 524.8 584.7 926.5		206- 600 (EA) 237- 700 (EA) 92-2000 (EA) 92-2000 (EA) 342- 600 (EA) 373- 650 (EA) 461- 700 (EA) 173- 550 (EA) 226-2500 (EA) 321-1350 (EA) 379- 900 (EA) 561-1200 (EA) 650- 925 (EA)	N N N N N N N N N N N N N N N N N N N	Se Se In In Se Se Se Se Se Se	++1++111111111	CNS CNS CNS CNS CNS CNS CNS CNS CNS CNS	2.68 1.75 2.25 2.25 2.68 2.68	2 25 2 25 2 50 2 50 2 50 1 62 2 25 2 25 2 25	2.31	1.12 2.00 2.00 2.12 2.12 1.37 1.37 2.00 2.00 2.31 2.31	.375 .375 .312 .375 .375 .375 .375 .375 .375 .437 .437	.375 .375 .312 .375 .375 .375 .375 .375 .437 .437	.312 .437 .437 .500 .500 .375 .375 .437 .437 .500 .500
Le Roi A288	Ind Ind Ind Ind Ind Ind Ind Ind Ind Ind	1-714x7 2-23x334 4-22x334 4-32x34 4-34x34 4-4x41 4-4x41 4-5x6 4-634x7 8-634x7 V12-714x7		21.3-2000 33-2300 38-1800 44-1800 51-1800 70-1200 70-1200 140-1200 208-1200 135-1800 278-1200 416-1200	45.4 90.8 140.0 176.0 201.0 226.0 382.0 471.0 1002.0 1503.0 540.0 2004.0 3006.0	5.80 5.85 5.40 4.87 4.71 4.60 4.50 4.50 4.50 4.50 4.50 4.50	94.5-1200 (EA) 122-1200 (EA) 140-1200 (EA) 167-1200 (EA) 257- 900 (EA) 320- 900 (EA) 690- 650 (EA)	W N N W W W N N N N N N N N N N N N N N	In In In In In Se Se In Se In		Sil Sil CNS CNS CNS CNS CNS Sil Sil Sil Sil Sil	3 .34 1 .43 1 .43 1 .37 1 .68 1 .68 1 .87 1 .87 2 .81 1 .93 2 .81 2 .81 3 .34	1.43 1.28 1.50 1.50 1.75 1.75 2.81 2.81 2.81	1.18 1.37 1.37 1.75 1.75 2.12 2.12 1.62 2.12 2.12	1 06 1 06 1 18 1 25 1 25 1 62 2 50 2 50 2 50 2 50 2 50	.530 .187 .188 .370 .373 .373 .373 .470 .546 .546 .410 .546 .546	.530 .187 .188 .370 .373 .373 .470 .470 .546 .410 .546 .546 .625	.312 .312 .342 .372 .372 .372 .433 .433 .624 .624 .373 .624
Minneapolis-Moline (8) . 165-4 185-4 206A-4 283-4 403-4 425-6 605-6 1210-12A	Ind,Tr Ind,Tr Ind Ind,Tr Ind,Tr	4-35 8x4 4-35 8x4 4-35 8x5 4-41 4x5 6-41 4x5 6-45 8x6 12-45 8x6	26-1400 33-1500 40-1500 51-1300 65-1100 76-1300 100-1200	25-1400 38-1500 48-1300 60-1100 73-1300	165.1 185.7 206.5 283.7 403.2 425.5 605.0	5.75 5.75 6.15 5.40 5.40 5.40 5.25	105-1000 (BE) 124-1100 (BE) 152-1100 (BE) 210-1100 (BE) 304-1100 (BE) 302-1100 (BE) 446-800 (BE)	N N N N N N	Se Se Se Se Se Se Se	Hh Hh		1.46 1.46 1.46 1.72 1.84 1.72 1.84	1.46 1.46 1.46 1.59 1.72	1.25 1.25 1.50 1.62 1.50 1.62	1.25 1.25 1.25 1.37 1.50 1.37	.355 .355 .355 .490 .490 .490	.355 .355 .355 .490 .490	.341 .341 .341 .434 .434 .434

### Engines - Continued

VALVE	ES			PISTO	NS	Piston		RODS	NG			CRANI	KSH	AFT				CARBI		Lb.)		VERAL IENSIG	
Seats		в-Туре		Pins, Rings,	Length	per		er	Bushing	•	pasn as	Crank- Pin	-	MAIN BEAI	er and		Thread Size			without		(411.)	1
Inserts Used?	Insert Material (S.A.E. No.)	Camshaft Drive	Material	Weight with Pi Bushings (Oz.)	Piston Pin— Diameter and (In.)	Number of Rings	Material	Center to Center Length (In.)	Weight with Band Cap (Oz.)	Material	Counter Balanea	Diameter and Length (In.)	Number	Foulth	Rear Rear	Oil Pressure to	Spark Plug—T	Make	Size	Engine Weight Carburetor or I	Width	Height	Length
N N N N N N N N N N N N N N N N N N N		HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG	CI CI CI CI CI CI CI AI AI AI AI AI AI AI AI AI AI AI AI AI	25 28 29, 5 19 21 229, 5 23, 1 24 229, 5 23, 1 35, 5 37, 5 44, 5 44, 5 60 63, 5 66 66, 66 60, 80 81 108 118	1.00x3.26 1.00x3.51 1.12x3.44 1.12x3.56 1.12x3.56 1.12x3.56 1.25x3.93 1.25x4.07 1.31x3.62 1.25x4.07 1.25x4.20	33333344434444444554554444	3140 3140 3140 3140 3140 3140 3140 1035 1035 1035 1035 1040 1040 1040 1040 1040 2140 3140 3140 3140 3140 3140 3140 3140 3	51/8 6 6 16 6 16 6 16 6 16 6 16 6 16 6 16	15 21 21 15 15 15 15 21 22 26 26 26 26 37 37 37 39 2 50 78 76 97 97 97 97 97 166 166	CS¢ CS¢ CS¢ CS¢	Y Y Y N N N Op	1.50x1.00 1.75x1.11 1.75x1.11 1.50x1.00 1.50x1.00 1.75x1.12 2.00x1.22 2.00x1.22 2.00x1.52 2.00x1.51 2.00x1.51 2.20x1.51 2.20x1.51 2.25x1.51 2.25x1.51 2.25x1.51 2.62x2.00 2.62x2.00 3.00x2.0 3.00x2.0 3.00x2.0 3.00x2.0 3.00x2.0 3.00x2.0 3.00x2.0 3.00x2.0	2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	2.50x1.31 2.62x1.75 2.62x1.75 2.62x1.75 3.00x1.93 3.00x1.93 3.50x1.93 3.50x1.93 3.50x1.93 3.50x2.37 3.50x2.37 3.50x2.37	2.00x1.62 2.00x1.37 2.00x1.37 2.00x1.62 2.00x1.62 2.50x1.93 2.50x1.93 2.50x1.93 2.50x1.93 2.50x2.12 2.50x2.12 2.50x2.12 2.50x2.13 3.00x2.93 3.00x2.93 3.00x2.93 3.00x2.93 3.00x2.93 3.50x2.93 3.50x2.93	abe	14 mm 18 mm	Op Op Op Op Op Op Op Op Op Op Op Op Op O	5 3 4 4 0 p p 0 p p 1 1 4 4 1 1 1 4 4 1 1 1 1 1 1 1 1 1	131 270 270 270 179 179 285 293 440 440 445 590 605 605 605 630 820 1010 1010 11345 1195 1195 1195 11810 1810 1830	1614 1634 1634 1634 1658 1659 1519 1519 1778 1778 1778 2213 2213 2313 2214 2516 2814 2814 2814	153 4 191 6 1 191 6 1 4 1 193 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1813 in 1813 i
Namamamama Manamamama Manamamama Manamamama Manamamama Manamamama Manamamama Manamamama Manamama Manamama Manamama Manamama Manamama Manamama Manama Ma Ma Manama Manama Manama Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma	MA MA MA MI	HG HG Ch Ch HG HG HG	CI CI CI CI AI AI AI AI	35 53 84 115 25 25 29 31 52 48	.919x2.50 1.11x2.78 1.31x3.28 1.50x3.71 .937x2.86 .937x2.86 .919x2.96 1.10x3.54 1.10x3.54	5 4 4 4 4 4	1040 1040 1040 1040 (bb) 1040 (aa) (aa) (aa) (aa)	714 8 10 11 814 814 89 89 9	33 57 93 124 34 33 43 43 61 61	10453 10453 10453 10453 (bb) (bb) C1046 C1046 C10463 C10463	N N N Y Y Y Y Y	1.75x1.1 2.25x1.2 2.50x1.7 3.00x1.9 2.62x1.5 2.00x1.3 2.12x1.6 2.75x1.6 2.75x1.6 2.75x1.6	3 3 2 3 7 3 4 4 1 4 8 4 8 7 8 7	2.50x1.49 2.75x1.56 3.25x1.87 2.62x1.54 2.70x1.12 2.70x1.12 3.25x1.34	2.50x1.49 2.75x1.56 3.25x1.87 2.62x2.09 2.62x2.09 2.70x1.23 2.70x1.23 3.25x1.84	abceg abceg abcdeg abcde abcdeg abcdeg abcdeg abcdeg abcdeg	18 mm 18 mm 18 mm 76-18 14 mm 14 mm 14 mm 14 mm 14 mm	Zen Own Own Own Zen Zen Zen Hol Hol	7/8 1 11/4 13/8 11/4 11/4 11/4 11/4 11/4 11/4 11/4	1090°	17 <sup>15</sup> / <sub>16</sub> 18 <sup>1</sup> / <sub>8</sub> 20 <sup>5</sup> / <sub>8</sub> 23 <sup>15</sup> / <sub>16</sub> 24 <sup>1</sup> / <sub>4</sub> 23 <sup>15</sup> / <sub>16</sub> 26 <sup>5</sup> / <sub>8</sub> 26 <sup>5</sup> / <sub>8</sub> 26 <sup>5</sup> / <sub>8</sub>	331/2 341/4 383/4 425/6 337/8 4011/4 4011/4 4229/4 4229/6 4525/6	3011/331/8 331/8 37 401/4 421/8 471/8 471/8 4721/6 4721/6 4721/6 4721/6
N N N N N N		HG Ch Ch HG HG HG	CI AI AI AI AI AIs	19 12 12 12 24 40	.687x2.18 .812x2.71 .812x2.71 .875x2.79 1.00x3.5 1.12x3.6 1.25x4.5 1.25x4.5	3 3 3 3 4 4 4 4 4 4 4 4	CS MS MS CS CS CS DFS	51/2 93/1 93/1 7 8 9	15	CS 1040 1040 CS CS CS CS CS	N Y N N Y	1.50x1.0 1.93x1.3 1.93x1.3 2.00x1.2 2.00x1.5 2.25x1.1 2.25x2.2 2.75x2.2	00 3 11 3 11 3 15 7 10 7 2 7 13 7	2.00x1.37 2.33x1.75 2.33x1.75 2.50x1.93 2.50x2.12 2.68x2.75 2.50x3.91	2.00x1.3 2.33x1.9 2.33x1.9 2.50x1.8 2.50x1.3 2.68x1.7 2.50x2.6	aber aber aber aber aber aber aber aber	14 mm 14 mm 14 mm 14 mm 78-18 78-18 14 mm 14 mm	Str Str Str Str Str Str Str Str(2) Str(4)	11/4 11/4 11/4 13/4 2 13/4 2	300° 495 495 620° 925°	18 <sup>11</sup> / <sub>6</sub> 21 <sup>1</sup> / <sub>4</sub> 21 <sup>1</sup> / <sub>4</sub> 24 21 <sup>13</sup> / <sub>6</sub> 24 <sup>1</sup> / <sub>4</sub> 26 <sup>1</sup> / <sub>8</sub> 42 <sup>1</sup> / <sub>2</sub>	175/8 241/2 241/2 241/8 278/4 295/8 341/6 439/6	293/68 36 36 425/6 523/8 563/6 697/8 7515/1
m m m	Spec Spec Spec	HG HG HG HG HG HG HG HG	CI CI AI CI CI CI	160 179 160 179 186 204 40 96 104 176 204	1.37x4.6: 1.37x5.0: .750x2.8: 1.37x4.6: 1.37x5.0: 1.50x5.0: 1.50x5.5: 1.00x3.5: 1.37x3.8: 1.37x4.1: 1.50x5.0: 1.50x5.1:	0 4 11 3 22 4 00 4 00 4 00 4 00 4 00 4 00 4 00 4	AS AS AS AS DFS Dur Dur AS AS	121, 121, 69, 121, 131, 131, 88, 81, 121, 131, 131, 131, 131,	96 96 172 172 36 68 68 164 164	CNS Spec CNS CNS CNS		1.87x2.7 1.87x2.7 2.00x1.5 1.87x2.7 2.75x2.7 2.75x2.7 2.00x1.5 2.00x1.5 2.25x2.3 2.12x2.7 2.75x2.7	5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2.25x5.00 2.25x5.00 2.25x5.00 3.00x3.56 3.00x3.56 3.00x3.57 2.50x1.31 7.250x1.31 7.250x1.31 7.262x5.07 3.00x3.37	2.25x4.0 2.25x4.0 2.25x4.0 2.25x4.0 3.00x3.5 3.00x3.5 2.50x2.1 2.50x1.1 2.75x2.1 3.00x3.2 3.00x3.2	abe abe abe abe abe abe abce abce abce a	78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18 78-18	Zen Zen Zen Zen Zen Zen Zen Zen Zen Hol Hel Hol Zen(2	11/2	440 1700 1750 2100 2290 830 820 1700 1700 2435	25 25 171/2 253/4 253/4 291/4 291/4 211/6 241/2 241/2 241/2 241/2 311/2	2214 2214 143/8 2214 2214 24 17 25 273/4 273/4 293/8 293/8	74 <sup>1</sup> / <sub>4</sub> 75 51
		HG HG HG HG HG HG HG	AI AI CI AI AI AI AI AI AI	256 113/4 113/4 46 54 34 34 107 200 200 62 200 200 256	.750x2.4 1.00x2.9 .989x3.3 1.00x3.4 1.00x3.4	6 3 3 3 3 4 4 3 3 4 4 4 4 4 4 4 4 4 4 4	1040 1040 1045 1045 1045 1045 1040 1040	71 71 71 8 121 12 14 14 14 15 15	24 33 60 60 60 102 236 236	1040 1045 1045 1045 1045 1045 1045 1045	Y N N N N N N N N N Y	5.00x2.1 1.93x1.3 1.93x1.3 2.31x1.6 2.37x1.1 2.37x1.1 2.87x2.6 3.50x3.3 3.50x3.3 2.75x1.3 3.50x3.3 3.50x3.3	06 50 50 50 52 52 75 75 75	2.50x1.73 2.43x1.62 3 2.43x1.62 3 2.43x1.62 3 3.00x3.12	310 (9) 310 (9) 5 2.50x1.7 2 2.46x1.7	PS PS PS abeg abeg babeg abeg abeg abeg abeg abe	14 mm 18 mm 18 mm 14 mm 14 mm 14 mm 18 mm	Own Zen Zen Zen Zen Zen Zen Zen Zen Zen Ze	18, 8, 8, 8, 11, 11, 11, 11, 11, 11, 11,	2275 250 350 580 580 580 580 580 1645 1645 2500 3750 1300 3900	573% 1634 1634 20 20 20 23 23 34 34 305% 45	49 19% 31½ 30 31 30 43½ 59 59 39% 65 65 75	40 <sup>23</sup> , 17 24 33 35 <sup>1</sup> / <sub>4</sub> 35 <sup>1</sup> / <sub>4</sub> 45 <sup>1</sup> / <sub>4</sub> 45 <sup>1</sup> / <sub>4</sub>
шшшшшшш	ACI ACI ACI ACI ACI ACI ACI	HG HG HG HG HG	CI	56 54 54 85 99 85 108 108	1.00x3.0 1.00x3.0 1.00x3.0 1.25x3.8 1.25x4.1 1.25x3.8 1.25x4.2	0 4 0 4 0 4 7 4 2 4 7 4	DFS DFS DFS DFS DFS DFS	9 9 83 10 111 10 111	54 54 45 90 4 97 90 1 100	DFS DFS DFS DFS DFS DFS	N N N N N Y	2.62x1 2.62x1 2.62x1 2.57x2 2.75x2 2.57x2 2.75x2 2.75x2	28 28 28 22 29 22 09	2 SAE212(7 2 SAE313(9 3 SAE212(7 3 2.91x2.1 4 2.91x2.1 4 2.91x2.1	3.00x2.1	8 abeft beft 8 abeft 60 abcefgi 60 abcefgi 60 abcefgi	14 mm 14 mm 14 mm 78-18 78-18 78-18	Sch Sch	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	x600 x600	25 <sup>3</sup> / <sub>4</sub> 25 <sup>3</sup> / <sub>4</sub> 25 <sup>3</sup> / <sub>4</sub> 25 <sup>3</sup> / <sub>4</sub>	32% 32% 32% 413% 475%	37% 37% 37% 45% 45%

### American Gasoline

				MAXI BRAK	E Hp.	3									VALV	ES				
			lers,	at Specifie	d R.P.M.	ant (Cu. In.)	0	e at with or les	Type	r Half nders		Material	Max. I Diam (In	eter	Min. Diam (In	eter	Lift (In.)		Ste Diam (In	eter
	ENGINE MAKE AND MODEL	Designed for	Number of Cylinders, Bore and Stroke (In.)	With Bare Engine	With Standard Accessories	Piston Displacement	Compression Ratio	Maximum Torque at R.P.M. (Lb. Ft.) with without Accessories	Cylinder Liners-Type	Crankcase—Upper Half Integral with Cylinders	Arrangement	Exhaust Head Mc (S.A.E. No.)	Intake	Exhaust	intake	Exhaust	Intake	Exhaust	Intake	Exhaust
1.	Norberg230 .320 .340	M M M	6-37/6×41/8 6-4×41/4 6-4×41/2		90-3000 103-2400 135-3000	230 320 339	6.90 6.50 7.10	************	N N	In In In	111		1.43 1.50 1.71	1.25 1.37 1.56						
	Dilver 60HC 80HC 80KD 90 99 70KD 70HC 60KD	Tr Tr Tr Tr Tr Tr Tr Tr	4-35/6x31/2 4-41/2x51/4 4-41/2x51/4 4-43/4x61/4 6-31/2x48/6 6-31/2x48/6 4-35/6x31/2 6-31/2x4		21.2-1500 46.1-1200 45-1200 56.7-1125 65-1125 31.3-1500 36.3-1500 18-1500 48.5-1600	443.0 201.3 201.3 120.6	5.25 4.23 4.10 5.04 4.50 6.50 5.00	75-1000 (EA) 190-850 (EA) 190-850 (EA) 250-850 (EA) 295-850 (EA) 105-1150 (EA) 105-1150 (EA) 63-1000 (EA)	W W W W W W	In In In In In In		Sil Sil Sil Sil Sil Sil Sil	1.18 2.00 2.00 2.31 2.31 1.54 1.54 1.18 1.40	1.12 1.75 1.75 2.31 2.00 1.20 1.20 1.12 1.28	1.75 1.75 2.00 2.00 1.37 1.37 1.96	1.00 1.50 1.50 2.00 1.75 1.06 1.06 1.00 1.18	. 281 . 406 . 406 . 437 . 437 . 390 . 390 . 281 . 360	.281 .406 .406 .437 .437 .390 .390 .281	.375	5 .3 .3 .4 .4 .5 .3 .3 .3 .3 .3 .3
1	Packard	M	6-3½x4¼ 8-3½x4%				7.00		N N	In In	L	AUS	1.67 1.67	1.43			.318	.318		
1	Reo	T,B T,B T,B	6-31/2x41/4 6-31/2x5 6-35/x5	96-3000		288.0	6.20 6.20 6.20		N N N	In In In	111	Sil Sil Sil	1.78 1.78 1.78	1.62 1.62 1.62			.312 .312 .312		.37	3 .
	Seripps 34	M M M M M M M M M M M M M M M M M M M	4-314x4 4-324x4 6-324x5 6-334x5 6-444x514 6-414x514 6-414x514 6-414x534 6-424x534 6-434x534 6-434x534 6-434x534 6-5x534 6-5x534 8-3x634		50-3200 95-3000 95-3000 120-3000 110-3000 169-3000 168-2400 175-2400 200-2400 212-2400 212-2400 212-2400 130-3600 304-2400 255-220	134.0 220.0 221.0 331.0 331.0 320.0 447.0 549.0 549.0 611.0 611.0 678.0 678.0 678.0 221.0 239.0 305.0 894.0	6.10 5.63 6.20 6.20 5.75 5.20 5.75 6.20 5.75 6.20 5.75 6.20 6.20 6.16 6.16 6.16 6.20 6.20	187-1200 (BE) 239-1700 (BE) 154-2200 (BE 178-2200 (BE) 232-2200 (BE)		. Se		Sill Sill Sill Sill Sill Sill Sill Sill	1 48 1 93 1 60 1 93 1 75 2 25 2 25 2 25 2 37 2 56 2 37 2 56 2 37 2 56 2 50 2 50 2 50 2 50 2 50 2 50 2 50 2 50	1.93 1.39 1.93 1.62 2.25 2.28 2.28 2.28 2.28 2.28 2.28 2.37 1.53 1.53 2.25 2.25	1.25 1.43	1.12	.250 .406 .281 .406 .322 .375 .405 .405 .405 .405 .406 .296 .292 .292 .375 .375	. 406 . 281 . 406 . 322 . 375 . 375	311 377 311 377 377 377 377 377 377 377	0 5 2 5 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
-	Sterling. Viking II-TC-6 Viking II-TC-6 Viking II-TC-8 Viking II-TC-8 Viking II-TC-8	Tr,Ind Tr,Ind M Tr,Ind Tr,Ind	6-8x9 6-8x9 8-8x9 8-8x9 8-8x9		345- 900 600-1200 600-1200	2714.3 3619.0 3619.0	5.20	2015- 900 (EA 2015- 900 (EA 2685- 900 (EA 2685- 900 (EA 2685- 900 (EA	WW	Se Se	1	SII SII SII SII	2.59 2.59 2.59 2.59 2.59	2.59 2.59 2.59			.556 .556 .556 .556	. 550 . 550	.55 6 .55 6 .55	17
0 1 1 2 3 3 4 5 6 6 7 7 8 9 9 1 1 1 2 2 3 4 4 5 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Thorobred (10) KK	M M M M M M M M M M M M M M	2-334x434 4-234x314 4-234x4 4-334x44 4-334x434 4-434x5 4-434x6 4-5x7 4-534x7 4-5x7 6-414x434 6-434x6 6-5x7 6-5x7 6-5x7 6-5x7	11-110 18-250 19-180 38-280 43-220 27-140 39-140 47-180 60-120 75-110 82-210 88-280 98-250 94-110 116-110 128-110	16-2800 16-1800 35-2600 37-2200 24-1400 36-1400 56-1600 56-1600 78-1100 83-2800 95-2500 101-1500 90-1100 112-1100	61.3 95.0 133.0 186.6 210.0 259.0 318.0 382.0 727.0 791.7 320.0 404.0 572.1 707.0 825.0 1091.0	4.00	40-1700 (BE   53-1300 (EA   92-1200 (EA   128-900 (EA   113-700 (EA   113-700 (EA   128-900 (EA   130-900 (EA   224-1100 (EA   409-900 (EA   409-900 (EA   409-900 (EA   420-900 (EA   420-900 (EA   420-900 (EA   430-875 (EA	N N N N N N N N N N N N N N N N N N N			Sil Sil NCI NCI CNS Sil Dia Sil Sil Sil Sil Dia Dia	1.12 1.46 1.34 1.56 1.62 1.93 2.09 2.34 2.75 2.75 2.75 2.75 2.75 2.34 2.34 2.75 2.75	.937 1.34 1.56 1.62 1.93 2.09 2.79 2.79 2.79 2.79 2.79 2.34 2.34 2.34 2.37 2.79 2.79 2.79 2.79 2.79 2.79 2.79 2.7	1 .00 1 .31 1 .18 1 .37 2 .1 .43 2 .1 .23 3 .1 .75 5 .2 .37 5 .3 .37 5 .3 .37 5 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3	1.18 1.18 1.37 1.43 1.75 1.75 1.93 2.2.12 2.37 2.37 1.25 2.2.12 2.2.12 2.37 2.37 2.37 2.37 2.37	. 228 . 250 . 281 . 300 . 300 . 300 . 375 . 375 . 375 . 375 . 375 . 375	. 256 . 256 . 28 . 30 . 30 . 30 . 30 . 30 . 37 . 37 . 37 . 37 . 37 . 30 . 30 . 30 . 30 . 30 . 30 . 30 . 30	0 31 0 31 1 37 1 37 0 33 0 33 0 43 65 5 66 5 66 5 66 6 66 6 66 6 66 6 66	12 12 12 175 75 75 75 75 75 75 75 75 75 75 75 75 7
2	Twin Coach	M M M M M	6-41/x43/x 1-42/x41/2 2-3x31/2 4-22/x33/x 4-23/x34/x 4-3x31/2 6-3x31/2 6-31/2x41/2 6-31/2x41/2 8-31/2x41/2 8-31/2x41/2	180-280	8-1200 12-2200 25-3500 25-2500 40-3500 50-3500 90-3000 110-3400	67.0 49.1 64.1 95.1 99.1 149.1 148.1 260.1 260.1 347.1	8 4.66 5.76 6.36 0 4.76 0 6.06 3 5.76 6.06 0 5.76 0 5.76	380-1600 (EA	. N . N . N . N . N . N . N	Se		Sil Sil Sil Sil	1.87 1.68 1.21 1.25 1.68 1.68 1.68 1.68	1.8 1.6 1.0 1.2 1.6 1.6 1.6 1.6 1.6 1.6	7	875	. 250	250 .250 .250 .244 .23 2 .312 .312 .312 .3132 .3133 .32	0 .3 0 .3 0 .3 4 .3 2 .3 2 .3 2 .3 2 .3 8 .3	75 75 12 75 75 75 75 75

For abbreviations see pages 166 and 167

### Engines — Continued

For abbreviations see pages 166 and 167

Er

V

(Deg.)

				MAXII BRAKI at Specifie	E Hp.	u. In.)									VA	LVES				
				jine		ement (Cu.	Satio	orque at Ft.) with or ssories	s-Type	Upper Half Cylinders		Material	Max. Dian	neter	Min. Diam (Ir	eter	Li:		Ste Diam (Ir	neter
	ENGINE MAKE AND MODEL	Designed for	Number of Cylinders, Bore and Stroke (In.)	With Bare Engine	With Standard Accessories	Piston Displacement	Compression Ratio	Maximum Torque K.P.M. (Lb. Ft.) w without Accessorie	Cylinder Liners	Crankcase Up	Arrangement	Exhaust Head (S.A.E No.)	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Fyhauet
	Waukesha (12) ICK (12) FC (12) FC (12) FAH (19) FC (11) 68Z (11) 68Z (11) 140-GK (11) 68Z (11) 145-GK (12) 6WAK (12) 6WAK (12) 6WAK (12) 6WAK (11) 145GZ 6WAZ (11) 145GZ 6WAZ (11) 140GX (11) 140GZ (11) 140GZ (11) 140GZ	Ind T,Tr,Ind T,Ind T,Ind T,B,Ind T,B,Ind T,B,Ind T,B,Ind Ind Ind Ind Ind T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind T,B,Tr,Ind	4-21/2x31/8 4-31/4x4 4-35/8x41/2 6-33/8x4 6-41/2x51/2 6-51/4x61/2 6-7x81/261/2 6-8x1/261/2 6-53/8x6 6-41/4x51/2 6-51/4x6	18-2600 32-2600 43-2200 61-1800 105-3000 142-2250 126-2250 126-2250 126-2000 221-1050 430-1050 220-2000 128-2800 176-2800 128-2600 225-2400	200-950	61 .3 133 .0 185 .0 265 .0 320 .0 525 .0 517 .0 779 .0 1962 .0 2894 .0 817 .0 404 .0 525 .0 554 .0 779 .3	6.60 6.00 5.90 6.40 6.40	40-1700 (BE) 86-1200 (BE) 120-900 (BE) 210-900 (BE) 235-1000 (BE) 425-1000 (BE) 590-1200 (BE) 590-1200 (BE) 590-1200 (BE) 665-900 (BE) 615-1200 (BE) 2260-800 (BE) 435-800 (BE) 435-800 (BE) 460-800 (BE)	N N N N N N N N N N N N N N N N N N N	Se In In In In In Se In	444-4-44		1.12 1.34 1.56 1.40 1.68 2.12 2.16 2.37 2.65 2.84 3.50 2.37 1.93 2.12 2.12 2.56	.937 1.34 1.56 1.28 1.43 1.56 1.65 1.84 2.22 2.53 3.00 1.84 1.68 1.56 1.56	1.00 1.18 1.37 1.25 1.50 1.87 2.12 2.37 2.50 3.25 2.12 1.87 1.87 2.31	.812 1.18 1.37 1.12 1.25 1.37 1.62 2.00 2.25 2.75 1.62 1.37 1.37	.228 .281 .302 .359 .375 .531 .386 .594 .656 .718 .750 .594 .375 .540 .540	.250 .281 .275 .375 .375 .375 .531 .656 .718 .840 .531 .375 .540 .540	.312 .375 .375 .375 .434 .375 .500 .500 .562 .497 .375 .437 .437	.31; .37; .37; .43; .50; .50; .56; .49; .43; .43;
	White 100A 120A 140A 140A 260A 260A (H) 24A	T,B T,B T,B T,B T	6-37/6x41/2 6-37/8x41/ 6-37/8x51/8 6-4x51/8 6-43/8x5 6-45/8x5 12-41/8x41/4	90-2800 110-2600 125-2600 135-2800 170-2800 184-2800 210-2800		250.0 318.0 362.0 386.0 451.0 504.0 681.0	6.28 6.40 6.25 6.00	185-1400 (BE) 250-1200 (BE) 285-1400 (BE) 315-1300 (BE) 350-1200 (BE) 405-1200 (BE) 500-1200 (BE)		In In In In In		\$t Sil°(x) Sil°(x) Sil°(x) Sil°(x) Sil°(x) Sil°(x)	1.86 1.97 1.97 1.97 2.35 2.35 1.85	1.63 1.63 1.63 1.63 1.88 1.88 1.75	1.43 1.75 1.75 1.75 1.99 1.99 1.62	1.49 1.49 1.49 1.49 1.75 1.75 1.62	.381 .381 .423 .423	.381 .381 .423 .434	.373 .373 .373 .373 .434 .434	.43 .43 .43 .43 .43
	Willys4-63	C,T	4-31/8x43/8	63-4000		134.2	6.48	105-2000 (BE)	N	In	L	CHS	1.53	1.46	1.34	1.28	.359	.359	.373	.37
The state of the s	Wisconsin. TE	M.Tr,Ind M.Tr,Ind	4-3x3 <sup>1</sup> / <sub>4</sub> 4-3 <sup>1</sup> / <sub>4</sub> x3 <sup>1</sup> / <sub>4</sub> 4-3 <sup>1</sup> / <sub>2</sub> x3 <sup>1</sup> / <sub>2</sub>	31-2200	13.3x2600 22-2600 25-2400 31-2200			27-1600 (EA) 32.5-1600 (EA) 50-1600 (EA) 57-1600 (EA) 86-1600 (EA) POWER UNIT	N N N	Se Se Se Se	11111	AUS AUS AUS AUS AUS	1.31 1.31 1.31 1.31 1.56	1.31 1.31 1.31 1.31 1.56	1.12 1.12 1.12 1.12 1.37	1.12 1.12 1.12 1.12 1.37	.275 .275 .275 .275 .275	.275 .275 .275 .275 .275	.309 .309 .309 .309	30 .30

### ABBREVIATIONS

\*—5.00 for gasoline, 6.00 for natural gas or buttane

\*—5pecial

\*—Two rods used; 1 clamped tight weighing 308 oz., and 1 loose outside of bearing weighing 240 oz.

\*—Dual Venturi

\*—Cast Iron 315, Aluminum 250 lbs.

‡—Super-Charged engine

‡—8½ in. for link rod; 12 in. for master rod

(2)—Two used

(3)—Three used

(4)—Four used

(7)—Roller Bearings

(8)—Minneapolis Moline Power Implement Co.

(9)—Ball Bearings

(10)—Red Wing Motor Co.

(11)—Automotive Power Ratings

(12)—Industrial Power Ratings

(12)—Industrial Power Ratings

(13)—Cast Alloy

a—Main Bearings

(aa)—AISI-8640-H

ACI—Aluminum Alloy, Anodized

Alis—Aluminum Alloy, With Steel Strut

Alt—Aluminum Alloy, With Steel Strut

Alt—Aluminum Alloy, Cin coated)

AS—Alloy Steel

AUS—Austentite Steel

Ay—Aloy Steel

AUS—Austentite Steel

Ay—Aloy Steel

AUS—Outseting Rods

(bb)—C1045GFQ

(BE)—Bare Engine

BG—Bevel Gear

Bf—107-Blade, 133 Fork

BO—Used in both Intake and Exhaust seats

C—Cars

c—Camshaft Bearings

CA—Cast Alloy

Car—Carter Carburetor
CAS—Cast Alloy Steel
Ch—Chain
CHS—Chrome Nickel Silicon Steel
CI—Cast Iron
CIA—Cast Iron, Anodized
CM—Chrome Molybdenum
CMT—Chromium Tungsten Steel
CNI—Chrome Nickel Iron
CNM—Chrome Nickel Iron
CNM—Chrome Nickel Molybdenum
CNS—Chrome Nickel Steel
CNT—Chrome Nickel Steel with Tungsten
CS—Carbon Steel
CS—Carbon Steel, Case Hardened
CT—Cast Iron, Tin Plated
D—Dry Liners
d—Wrist Pins
DC—Durachrome Castings
DFS—Drop Forged Steel
Dia—Diachrome

### City Automobile Registration,

Cities Above 100,000 Population	Pass. Cars <sup>1</sup>	Trucks 1	Popula- tion <sup>2</sup>	Pop. Per Pass. Cars	Cities Above 100,000 Population	Pass.	Trucks 1	Popula- tion <sup>2</sup>	Pop. Per Pass. Cars
Akron, Ohio	67,867	7,387	274,000	4.0	Fort Wayne, Ind.	. 35,076	4,838	130,000	3.7
Albany, N. Y	23,650	6,519	135,000	5.7	Fort Worth, Tex		8,768	230,000	4.3
Atlanta, Ga	69,202	13,726	330,000	4.8	Gary, Ind.		2,656	125,000	5.8
Baltimore, Md		21,603	930,000	6.3	Grand Rapids, Mich.	51,020	6,374	175,000	
Birmingham, Ala	45,120	9,627	310,000	6.9	Hartford, Conn	52,817	8,981	190,000	3.6
Boston, Mass	77,765	17,158	800,000	10.3	Honolulu, T. H.4	40,692	7,654	348,045	8.6
Bridgeport, Conn	41,667	6,274	165,000	4.0	Houston, Texas	108,369	20,991	475,000	4.4
Buffalo, N. Y	130,733	17,506	598,285	4.6	Indianapolis, Ind.	104,187	15,254	416,000	4.0
Cambridge, Mass.	13,928	3,399	110,879	8.0	Jacksonville, Fla	42,189	8,666	206,442	4.9
Camden, N. J.	28,331	4,953	120,000	4.2	Jersey City, N. J.	29,009	6,269	313,170	10.8
Canton, Ohio	32,800	4,141	130,000	4.0	Kansas City, Kan.	30,230	4,999	158,000	
Charlotte, N. C.3		6,277	100,899	4.6	Kansas City, Mo	87,054	15,128	440,000	
Chattanooga, Tenn,	21,591	4,739	140,000	6.5	Knoxville, Tenn.	25,967	5,683	165,000	
Chicago, Ill.	476,456	65,822	3,400,000	7.1	Long Beach, Calif.	74,235	5,166	276,000	3.7
Cincinnati, Ohio	111,447	15,906	455,610	4.1	Los Angeles, Calif.	472,823	57,776	1,840,000	3.9
Cleveland, Ohio		30,912	866,508	3.4	Louisville, Ky	59,706	10,886	364,010	
Columbus, Ohio	90,226	15,602	325,000	3.6	Lowell, Mass	11,598	2,120	101,331	8.7
Dallas, Texas	103,538	12,968	460,000	4.4	Memphis, Tenn	47,186	9,398	350,000	
Dayton, Ohio		7,389	250,000	3.5	Miami, Fla.	81,167	12,879	197,326	2.4
Denver, Colo	86,372	12,216	380,000	4.4	Milwaukee, Wisc.	144,843,	19,034	601,000	
Des Moines, Iowa		5,905	170,000	5.0	Minneapolis, Minn.	122,976	15,663	517,000	
Detroit, Mich		44,661	1,800,000		Nashville, Tenn.	35,964	6,954	175,000	
Duluth, Minn	21,994	3,474	101,471	4.6	Newark, N. J.	79,020	23,490	430,000	
Elizabeth, N. J		3,964	115,000	3.5	New Bedford, Mass	19,344	3,159	115,179	6.0
Erie, Pa.	29,496	4,050	131,000	4.4	New Haven, Conn.	46,753	8,774	160,000	
Fall River, Mass.	14,341	2,371	115,000	8.0	San Antonio, Tex.	81,586	12,965	400,000	
Flint, Mich	40,717	3,397	175,000	4.3	San Diego, Calif	75,148	6,618	325,000	4.3

### Engines-Concluded

3

٧	ALVI	ES			PISTO	ONS	ton	CON	NECTI RODS	NG			CRANK	SH	AFT				CARBU		).		OVERA MENS	
	Seat	s	Type		Rings,	th.	per Piston			5u		David	Crank- Pin	N	IAIN BEA	RINGS		d Size	Ī		hout ion (L		(10.)	
	d?	Material . No.)			with Pins, js (Oz.)	und Length	Rings		Center n.)	th Bushing		lance U	(In.)		Diamet Length		re to	-Thread			ight wit or Ignit			
Angle (Deg.)	Inserts Used?	S.A.E. No	Camshaft Drive	Material	Weight wit Bushings (	Piston Pin— Diameter and I (In.)	Number of	Material	Center to C Length (In.)	Weight with and Cap (Oz.	Material	Counter Balance	Diameter a Length (In	Number	Front	Rear	Oil Pressure	Spark Plug-	Make	Size	Engine Weight without Carburetor or Ignition (Lb.)	Width	Height	Length
15 15 15 11 15 15 16 10 10 10 10 10 10 10 10 10 10 10 10 10	<b>Мимимимимимими</b>	CA CA CA CA CA CA CA CA TS TS TS	HGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG	AI CI CI AI AI AI AI AI AI AI AI	8 30 45 46 64 70 103 292 304 776 110 45 64 67	.625x2.12 .875x2.75 1.12x3.03 1.25x3.00 1.00x3.85 1.37x4.25 1.62x4.87 1.87x5.50 2.00x6.00 2.25x7.75 1.62x4.50 1.00x4.00 1.37x3.87 1.37x3.87 1.62x4.50	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1045 1045 1045 1045 1045 1045 1045 1045	6 714 834 634 8 1014 1134 1538 1838 1014 1014 1134	14 29 46 40 85 83 133 195 314 474 133 48 85 85	1045 1045 1045 1045 1045 1045 1045 1045	N N N N N N N N N N N N N N N N N N N	1.56x1.25 1.75x1.06 2.00x1.50 2.25x1.37 2.00x1.50 2.62x2.00 2.75x1.75 3.00x2.25 3.37x2.37 3.25x2.75 4.00x3.75 4.00x3.75 2.25x1.50 2.62x2.00 3.00x2.25	3 3 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2.62x1.62 3.25x1.59 3.25x1.59	3.00x3.00 3.50x3.50 4.00x3.56 3.75x5.50 4.25x5.50 3.50x5.50 2.62x2.75 3.25x3.00	abcdeg abcdeg abcdeg abcde abcde abcdeg abcdeg	14 mm 18 mm ½-18 18 mm 18 mm 18 mm ½-18 18 mm	Op Op Op Op Op Op Op Op Op Op Op Op Op O	3/8 1 1 11/2 11/2 13/4 13/4 2 21/2 21/2 21/2 21/2 13/4 13/4 13/4 13/4 13/4 13/4 13/4 13/4	143 290 385 706 1390 1225 1810 3050 5900 9200 1810 920 1390 1390 1810	1415/6 19 177/8 22 191/4 235/8 241/8 253/4 305/8 3113/6 481/2 253/4 207/8 235/8 235/8 235/8 235/8	201/2 263/4 27 291/6 31 4113/6 393/8 463/8 507/8 6113/6 65 485/8 343/4 4113/6 463/8	2115 2734 3278 4258 3912 5038 46516 655 9518 4311 5038 5718
555555	шшшшшшш	St St Spec° Spec° Spec° St	HG HG HG HG HG	AI AI AI AI AI	38 45 45 55½ 54 62 30	1.00x3.03 1.00x3.46 1.00x3.46 1.18x3.62 1.24x3.93 1.24x3.93 1.18x3.31	4 4 4 4	1040 1040 1040 1040 3130 3130 1040	915 22 915 22 915 22 91 42 91 4 91 4	52 52 75 75	1050 1050 1050 1050 1050 1050 1050	YYYYYY	2.18x1.34 2.18x1.34 2.18x1.34 2.18x1.34 2.50x2.06 2.50x2.06 2.43x2.31	7 7 7 7 7 7 7	3.00x1.84 3.00x1.84 3.00x1.84 3.00x1.84 3.25x1.68 3.25x1.68 2.87x2.09	3.00x1.93 3.00x1.93 3.00x1.93 3.25x2.00 3.25x2.00	abcdep abcdep abcdeps abcdeps abcdeps	14 mm 14 mm 14 mm 14 mm 18 mm 18 mm 18 mm	Str(Dp) Str(Dp) Str(Dp) Hol(dp) Hol(dp) Hol(dp) Zen(dp)	11/4 11/4 11/4 11/4 15/8 15/8	982 1003 1060 1300* 1409* 1442* 2275*	293/8 293/8 293/8 293/8 34 34	405/8 405/8 405/8 405/8 37 37	441 441 441 51 51
5	N	N	HG	AI	18.5	.812x2.78	3	1035	9316	34	1040	Y	1.93x1.30	3	2.33x1.92	2.33x1.75	abce	14 mm	ZC	11/4	344	19	263/8	261/4
5 5 5 5 5	Y Y Bo Bo Bo	MI MI MI MI	HG HG HG	AI AI AI AI	16 1814 16 18.2 28	.750x2.56 .750x2.56 .750x2.56 .750x2.56 .750x2.56 .937x2.75	4 4	1035 1035 1035 1035 1035	83/8 83/8 83/8 83/8	22 22 22	1045 1045 1045 1045 1045	Y N N N	1.75x1.12 1.75x1.12 1.75x1.12 1.75x1.12 1.75x1.25 GASOLIN	2 2 2 2	(9) (9) Timken Timken Timken	(9) (9) Timken Timken Timken	PS PS PS PS PS	18 mm 18 mm 18 mm 18 mm 18 mm	Zen Zen Zen Zen Zen	3/4 3/4 5/8 7/8	220*	167/8 167/8 211/2 21/2 24	22% 22% 251/2 251/2 253/4	22% 22% 25% 25% 25% 28%

### ABBREVIATIONS -Cont.

ABBREVIATIONS—Cont.

Dp—Duplex
Dur—Duralumin
e—Timing Gears or Chain
e—I sed on Exhaust valve seats
[EA:—Engine with Standard Accessories
Ecl—Eclipse
Ens—Ensign
f—Accessories drive
FA—Fire Apparatus
g—Rocker Arms and Shafts
(h)—Intake 30°, Exhaust 45°
[H]—Horizontal Motor
HC—Helical Gear and Chain
HG—Helical Gear
Hh—Horizontal in Head (Valve)
Hol—Holley Carburetor
HS—High Speed Steel
I—In Head (Valves)

In—Integral
Ind—Industrial
Jad—Jadson 1-S
JM—Jadson 1-S material
(k)—Intake 30°, Exhaust 44°
L—Valves at Side (L-Head)
M—Marine
MA—Molybdenum Alloy
MI—Moly Iron
ML—Mechanical Lubricator System
Mo—Molybdenum
MS—Manganese Steel
n—Intake 15°, Exhaust 44°
N—No or none
NCI—Nickel Cast Iron
Nir-Ni—Resist
NIS—Nickel Steel
Oh—Overhead Valves
Op—Optional

PS—Pump Splash system
P—Hydraulie Valve Lifters and Cylinder
Walls
r—Reverse Gear
RC—Rail Cars
s—Fan Drive Gears
SA—Special Alloy
SB—Spiral Bevel Gear
Sch—Schebler Carburetor
Se—Separate
SG—Spur Gear
SF—Steel Forging
Sil—Silerome Steel
Spec—Special
SS—Semi-Steel
St—Stellite Steel
St—Stellite Steel
St—Stromberg & Zenith
t—fappets and Valve Mechanism
T-12—Ih mpson Products No. 12

T—Valves. Opposite (T-Head)
T—Trucks
TA—Tungsten Alloy
Til—Tilotson Carburetor
Tr—Tractors
TS—Tool Steel
Tun—Tungsten Steel
V—Dual
W—Wet Liners
WA—Wausau Alloy
WM—Wausau Cast Moly No. 1
WR—Wilcox-Rich-EA5
(x)—Sodium Cooled
x—Complete with SAE housing
y—With reverse gear
y—Yes
Zon—Zenith Carburetor
ZC—Zenith or Carter

### Population and Persons per Car

Cities Above 100,000 Population	Pass.	Trucks 1	Popula- tion <sup>2</sup>	Pop. Per Pass. Cars	Cities Above 100,000 Population	Pass.	Trucks 1	Popula- tion <sup>2</sup>	Pop. Per Pass. Cars
New Orleans, La.	65,640	13.257	559,000	8.5	Scranton, Pa	21,047	4.907	140,000	6.7
New York, N .Y.	634,802	123,775	7,625,000	12.0	Seattle, Wash		17,006	470,000	3.6
Norfolk, Va	31,110	5.817	190,000	6.1	Somerville, Mass.	10,429	1,141	105,828	10.1
Oakland, Calif		11,193	401,700	4.1	South Bend, Ind	28,235		115,600	4.1
Okla. City, Okla	55,541	12,727	225,000	4.1	Spokane, Wash		6,404	140,000	3.8
Omaha, Nebr	46,719	7,636	240,000	5.1	Springfield, Mass.	29,927	4,411	160,000	5.3
Paterson, N. J		6,094	140,000	4.6	Syracuse, N. Y.	44,119	6,986	215,000	4.9
Peoria, Ill.	00 04 =	3,895	105,000	3.9	Tacoma, Wash	42,937	6,354	139,000	3.2
	210,877	43,019	2,060,000	9.8	Tampa, Fla		7,406	124,476	3.5
Pittsburgh, Pa	122,451	21,327	730,500	6.0	Toledo, Ohio		8,484	310,000	4.0
Portland, Ore	120,324	12,464	410,000	3.4	Trenton, N. J.		6,617	130,000	4.1
Providence, R. I.	68,018	11,488	265,000	3.9	Tulsa, Okla	42,714	9,546	185,000	4.3
Reading, Pa	19,657	3,845	120,000	6.1	Utica, N. Y.		3,199	101,000	5.2
Richmond, Va.3	42,108	11,065	193,042	4.6	Washington, D. C.		13,804	850,000	7.8
Rochester, N. Y		11,122	325,000	3.9	Wichita, Kan	46,379	8,006	156,000	3.4
Sacramento, Calif.	44.195	7,256	125,000	2.8	Wilmington, Del	25,004	4.083	121,000	4.8
St. Louis, Mo	212,772	31,379	830,000		Worcester, Mass	30,194	4,824	199,000	
St. Paul, Minn		10,446	294,200		Yonkers, N. Y	27,173	3,099	147,000	5.4
Salt Lake City Utah		7,042	185,000		Youngstown, Ohio	34,687	4,619	170,000	4.9
San Francisco, Calif.		25,623	827,400		Total, 93 Cities	7,539,677		41,941,901	5.6

N. I.—No Record.

1—Total car and truck registrations by R. L. Polk & Co. as of July 1, 1946.

2—Figures furnished by city engineers of all cities surveyed by Automobile Manufacturers Association as of January 1, 1945.

3—Figures for area and street mileage are as of January 1, 1940.

4—Figures for area and street mileage are of January 1, 1945. Data refer to entire Island of Oahu.

Population from U. S. Census, 1940.

Data secured from Facts and Figures, 1946—1947.



										GENERAL				_	,				1	/ALVES
	ENGINE MAKE	se from			n.)	-Type		ıı	With Bare Engine	With St Access		_to 1	Pressure	snone (*)	snon	. Ft.	We	ping light b.)		
	AND MODEL	Built Under License	Designed for	Type	Number of Cylinders Bore and Stroke (In.)	Cylinder Liners—T	Cycle	Piston Displacement (Cu. In.)	Maximum Brake Hp. at Specified R.P.M.	Max. Intermittent Hp. at Specified R.P.M.	Continuous Sustained Hp. at Specified R.P.M.	Compression Ratio	Max. Combustion (Lb. per Sq. In.)	E.P. at	-	Max. Torque in Lb. at Specified R.P.M.	Automotive or Industrial	Marine	Arrangement	Intake Port Diameter and Lift (In.)
-	Atlas Imperial 1LN29	A - 8 - 9 - 9 - 8 - 9 - 9 - 9 - 9 - 9 - 9	I I I,M I,M	AC	1-3½x3¾ 3-3½x3¾ 4-6¼x8¼ 6-6¼x8¼	W W W	4 4 4	101	20-1800	5.7-1800 16.5-1800	5-1800 15-1800 90- 900 135- 900	16.50 16.50 13.8 13.8	70	. 76 0 78	40.34 62.2		604 5600		VI	1.063 1.063 2.315 2.315
	Buda 1BD-38	Lanova	I M,1 T,Tr,M,1 T,Tr,M,1 T,Tr,B,M,T T,Tr,B M,1 T,Tr,B,I M,T,T,T,B,I M,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T,T	ACCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	1-3 1 x 4 1 6 2-3 1 x 4 1 6 6 -3 1 x 4 1 6 6 -3 2 x 5 1 2 6 -3 2 x 5 1 2 6 -4 2 x 5 1 2 6 -6 2 x 5 2 7 2 x	W W W W W W W W W W W W W W W W W W W	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	7: 15: 233 31: 31: 466 466 187: 187: 84 84 84 84 84 84 84 84 84 84 84 84 84	7 17-2000 3 39-2400 58-2400 7 90-2300 8 113-2000 8 248-1100 9 248-1100 4 180-1800 4 180-1800 4 225-1800 248-100 5 239-1800 5 239-1800 5 300-1800 5 300-1800 6 300-1800 7 330-1200	7-2000 15.8-2000 36.8-2000 46-2400 46-2400 75-2300 75-2300 203-1100 150-1800 168-1800 195-1800 197-1800 210-1800 242-1800 242-1800 494-1400 2475-1200 275-1200	6.5-1800 13-1800 26-2000 40-2000 52.5-1800 68-1600 75-1600 155-900 96-1200 112-1300 140-1400 147-1400 148-1400 184-1410 71-1200 196-900	15.3 15.3 14.5 14.5 14.2 14.2 13.0 13.0 13.0 13.0	72 72 72 72 72 72 72 72 72 72 72 72 72 7	25 74 25 73 25 73 25 73 25 78 25 78 26 78	46.14 29.2 21.5 21.64 22.3 21.14 23.7 44.84 34.9 58.14 29.84	104-1400 156-1400 195-1500 268.5-1100 308-1100 1043-650 1140-650 1043-650 460-1100 518-1100 635-1250 635-1250 635-1250 646-1100 700-1250 850-1250 850-1250	600 760 860 1133 1435 6950 9000 2850	1000 1200 1250 1775 6500 3900	VI VI VI VI VI VI VI VI VI VI VI VI VI V	2.00
	Caterpillar D-311 D-315 D-318 D-8800 D-13000 D-17000	Own Own Own Own Own	Tr,M,I Tr,M,I Tr,M,I Tr,M,I Tr,M,R,I M,I,R	PC PC PC PC PC	4-4x5 4-4½x5½ 6-4½x5½ 4-5¾x8 6-5¾x8 8-5¾x8	W W W W	4 4 4 4 4	35 52 83 124		52-2000 70-1800 105-1800 98-1000 145-1000 180-1000	39-1650 53-1600 77-1600 79-1000 115-1000 131- 950	18.0		75 73 75	45.3 40.3 55.76 48.86	842- 80	2400 3100 0 4400 0 5610	2930 3620 55309 74509	VI VI VI	15/8- 131- 131- 131- 256- 25- 25- 25-
	Climax D-148		I,M I,M	PC PC	2-41/4×51/4 4-41/4×51/4	W	4			18-1200 36-1200	18-1200 36-1200			50 80 50 80		97- 60 197- 60		2500 3500		1.75- 1.75-
	Continental C D-157 HD-243 HD-260 TD-427 RD-57 TD-6427 RD-6672	Cwn Cwn Cwn Cwn Cwn Cwn	T,B,Tr T,B,Tr	TC TC TC TC TC	4-3%x4% 4-3%x5½ 4-3%x5½ 6-4%x4% 6-4%x5% 6-4%x5%	WWWNDNDND	4	24 26 42 . 42 . 57		87.2-2000 116-2000	74.9-1800 96.5-1800 95-2400	14.5 15 15 15 15		75	9 21.1 9 20.2 9 17.4 9 19.1 6 13.4	109-125 169.5-120 181-120 298-120 400-120 300-120 400-120	0 840 0 840 0 1300 0 1845 0 1270		VI VI VI VI	1.18- 1.37- 1.37- 1.71- 1.87- 1.71- 1.87-
	Cummins	Cwn	T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,R,I	DI	6-4x5 4-47xx6 6-47xx6 6-47xx6 6-51xx6	W W W W	4	4 67 4 67 4 74	100-1800 150-1800 2 200-1800 3 200-2100	83-1800 125-1800 175-1800 174-2100	50-1200 93-1600 130-1600 130-1800	17.0 17.0 14.0 13.0	00 7 00 7 00 9	50 7 50 7 25 10	4 32.8 2 25.5 1 19.8 6 19.2	340- 80 500- 80 625-140 575-140	0 1930 0 2540 0 3000 0 2500	3315 3670 4040 4000	VI VI VI	1.37- 1.75- 1.75- 1.75- 1.56- 1.56-
	Fairbanks-Morse (4) 36		M,R,I M,R,I	TC	6-41/4x6 8-51/2x71/2	W	1	4 51	8	. 75-1200 150-1200				00 7 00 7						
	General Motors 2-71	Cwn	T.B.Tr.I T.B.Tr.I T.B.Tr.I T.B.Tr.I I W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W		2-4\4x5 3-4\4x5 6-4\4x5 6-4\4x5 12-4\4x5 2-4\4x5 3-4\4x5 6-4\4x5 12-4\4x5 24-4\4x5 3-4\4x5 12-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5 24-4\4x5			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	12 3 3 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5	100-2000 133-2000 200-2000 400-2000 800-2000 85-2000 113-2000 170-2000 340-2000 100-2000 400-2000 800-2000	72-1800 96-1800 145-1801 290-1801 48-1801 72-1801 146-1801 290-1801 560-1801 72-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801 96-1801	# 16.   16.	CO 16 CC 16	600 7 600 7 600 7 600 7 600 7 880 880 880 880 880 880	8 16.0 8 14.0 8 11.0 8 18.0 20 28 23 20 22 24 23 23 24	300-1300 400-1300 600-1300 ° 2100-7405 ° 4200-7405	1177 130 165 165 165 1280 1290 201 216 264 640 1400 201 216 216 264	5		No Vall No Va
	Gray Marine Four D-15: Four D-26: Six D-57:	2	. M	PC PC	4-37/8×51/2 6-4%/x53/2	D	1	4 2 5	57 35-1800 60 55-1800 72 150-2000			. 15.	00 .		13.0	167-120	00	. 1500 . 2950	V	1 1.18- 1 1.37- . 1.87-
	Hallett DI-		T- M :	PC	2-37/8×41/4	N	-	1	50 9.5-1500 00 9.5-1500	18-1500	18-150	21.	60			64-180	00	. 760	V	1 1.62-
	Hercules	Own Own Own Own	Tr,M,I Tr,M,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,Tr,M,I,B T,Tr,M,I,B	TO TO TO	2-41/4 x 41/4 4-31/4 x 4 4-35/6 x 4 4-33/4 x 41/4	D		4 1 4 1 4 1 4 1	27-1800 27 27.6-1600 33 46-3000 65 57-3000 99 62-2600 26 70-2600	23.5-1600 39-3000 48-3000 53-2600	23.5-160 36-240 45-240 41-180	15. 15. 15. 15. 15.	50 00 00 00	750 9 825 8 825 9 750 9	92 23.5 92 25.5 99 15.5 90 12.6 91 18.6	91-130 98-160 2 122-160 3 142-140	00 55 00 55 00 55	60 550 60	٧	1 1.62- 1 1.62- 1 1.37- 1 1.56- 1 1.62- 1 1.62-

# OTHER HEAVY OIL ENGINES



VALVES		PIS	TONS			PISTOR	V		ODS	IG	BE	AIN AR- IGS		SY	STE						eui	- 11	RT- NG 'HOD	DI	OVERALL	IS	
Exhaust Port Diameter and Lift (In.)	Material	Length (In.)	Weight with Rings and Pin (Lb.)	No. of Compression Rings	No. of Oil Rings	Diameter and Length (In.)	Locked in-		Center to Center Length (In.)	Weight with Cap and Bushing (Lb.)	Number	Diameter (In.)	Make of Pump	Make of Valve	Valve Type—Open or Closed	Orifices	Pressure Nozzle Opening (Lb. per Sq. In.)	Air Cleaner-Make	Fuel Filter-Make	Lubricant Filter-Make	Minimum Recommended Cetane Number of Fuel	Make	Туре	Length—Fan to Flywheel (in.)	Width (In.	Height—To Top of Air Cleaner (In.)	I the Manual on
.96390 .96390 .00640	Alu	4.25	1.75 1.75 27.2 27.2		2 2 2 2	.937-2.75 .937-2.75 2.50-5.25 2.50-5.25	F	3140 3140 1040 1040	7.56 7.56 17.75 17.75	2.50 2.50 8.2 8.2	5	2.25 2.25 4.62 4.62	AB AB	AB AB AB AB	CCCC	Pi Pi Mu Mu	1800 1800 3000 3000	Opt	AB AB Pur Pur	Opt Opt Pur Pur	45 45 40 40	AL AL	E-H E-H A	20 16 31 1/2 93 1/8 114 1/8	20½ 23½ 33½ 33½	3618 3418 571/2 571/2	
12- ,429 12- ,429 12- ,429 18- ,486 18- ,486 37- ,476 16- ,687 16- ,687 16- ,540 87- ,540	AA Alu Alu Alu Alu Alu Alu Alu Alu Alu A	4.93 5.25 5.26 9.31 9.31 6.75 6.75 6.75 6.75 6.75 6.75	3.00 3.00 4.48 4.48 19.19 19.19 6.70 6.70 6.70 6.70 6.70 6.70	34433333333333333333333333333	122222222222222222222222222222222222222	1.00-2.75 1.00-2.84 1.00-2.84 1.00-2.84 1.25-2.92 1.25-2.92 1.25-3.56 2.75-5.53 2.75-5.53 2.75-5.53 1.75-4.50 1.75-4.50 1.75-4.50 1.75-4.50 1.75-4.50 1.75-4.50 1.75-4.50	****************	1035 1035 1045 1045 1035 6140 1035 1035 1035 1040 1040 1040 1040 1040 1040 1040	7.37 7.37 7.37 7.37 9.50 9.50 11.00 17.75 12.50 12.50 12.50 12.50 12.50 12.50 12.50 12.50 12.50 12.50 12.50 12.50	3.41 4.87 4.87 28.51 28.51 10.62 10.62 10.62 10.62 10.62 10.62 10.62 10.62 28.51	3 3 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	3.00 3.00 4.50 4.50 4.50 3.75 3.75 3.75 3.75 3.75 3.75 3.75 4.50	AB AB AB AB AB AB AB AB AB AB AB AB AB A	AB AB AB AB AB AB AB AB AB AB AB AB AB A	000000000000000000000000000000000000000	Pi Pi Pi Pi Pi Pi Pi Pi Pi Pi Pi Pi Pi P	2000 2000 2000 2000 2000 2000 1800	Uni Uni Uni Uni Uni Uni Uni	Com	Fra Fra WGB WGB DeL DeL DeL DeL DeL DeL DeL Com DeL DeL DeL DeL DeL DeL DeL DeL	46 46 46 48 48 48 48 48 48	AL AL AL DR DR DR DR-N D-N L-D L-D L-D L-D L-D L-D L-D L-D L-D L-D	E-H Ele Ele Ele Ele GGGGGGGGGGGGGGGGGGGGGGGG	18½ 22½ 30½ 38½ 42½ (11) 48½ (11) 95¾ (11) 95¾ 58½ 58½ 58½ 73 101¼ 83½ 101¼ 101¼ 101½ 101¼ 101½ 101¼ 101½ 101¼ 101¼	1934 1934 1934 1934 27 27 2534 37 30 30 4 30 4 30 4 30 4 30 4 30 4 3	291/6 291/6 281/6 263/6 351/6 (12) 37/6 (12) 38/6 (12) 62/6 (12) 62/6 (12) 48/6 48/6 45/4 48/6 48/6 48/6	
427 434 434 468 468 468	Alu Alu Alu Alu Alu	6.14 6.14 5.52 9.18 9.18		3333	22212	1.81-3.73 1.81-3.73 1.62-3.23 2.37-4.75 2.37-4.75 2.37-4.75		1045 1045 1045 1045 1045 1045	10.25 10.25		5 7 5 7	2.75 3.50 3.50 3.75 4.00	Own Own Own Own Own	Own Own Own Own Own Own	000000	SI SI SI SI SI		Don Don Don Don Don	Own Own Own Own Own	Pur Pur Pur Pur	35 35 35 35	Own Own Own Own Own	G	591/8 531/2 75 /8 70 /8 871/2 88	273/8 293/2 295/8 40 423/4 491/2	4111 5076 5658 5814 6676 6612	
5422 5422			7.87 7.87		1	1.75-3.50 1.75-3.50	F	1045 1045	11.50 11.50	6.43 6.43		3.00	AB AB	AB AB	CC	Pi Pi	2200 2200	Vor	CB	Nug Nug	45 45	AL AL	Ele Ele	46 68	32 32	53 53	
06375 25328 25328 50437 55546 50437 55546	AA AA AA	3.75 4.31 4.31 4.68 5.93 4.68 5.93		33333333	1 1 1 1	1.12- 1.25- 1.25- 1.43- 1.50- 1.25- 1.50-	F	S/B-CLM S/B-BAB S/B-BAB S/B-BAB S/B-BAB LB-CNM LB-CNM	7.00 9.50 9.50 8.37 10.50 8.37 10.50		3 7 7 7	2.37 2.87 2.87 2.87 3.25 2.87 3.25	A-E A-E A-E A-E	A-E A-E A-E A-E A-E A-E		Si Si Si Si Si	1600 1600 1600 1600 1600 1600 1600	Op Op Op					Ela Ela Ela Ela Ela Ela	315/8 335/8 335/8 47 7/8 51 148	197/8 21116 21116 27116 318/8	301/4 35 35 35 371/6 4433	
37406 75500 75500 75500 36420 36420	CI CI CI Alu Alu	5.04 6.25 6.25 6.25 6.25	5.70 10.56 10.56 7.21	33333	2 2 1	1.49-3.37 1.99-4.09 1.93-4.09 1.99-4.09 1.99-4.34 1.99-4.34		E-4135 E-4135 E-4135 E-4135	9.50 12.00 12.00 12.00 12.00	10.2	7 5 7 7 7	3.87 4.50 4.50 4.50 4.50	Own Own Own Own	Own Own Own Own Own		Mu Mu Mu Mu Mu Mu		Don Don Don Don Don Don	Com Com Com Com Com	Nug Nug Nug Nug	50 50 50 50 45 45	L-D L-D L-D L-D L-D	Ele Ele Ele Ele Ele	463/8 (2) 43 <sup>7</sup> / <sub>3</sub> (2) 57 <sup>3</sup> / <sub>2</sub> (2) 60 <sup>1</sup> / <sub>3</sub> (2) 61 <sup>7</sup> / <sub>3</sub> (2) 60 <sup>3</sup> / <sub>3</sub> (2)	283/8 235/8 235/8 30/8 237/8 323/8	39 ½ (3) 47 ½ (3) 47 ½ (3) 47 ½ (3) 47 ½ (3) 49 % 48 ½	
	CI (a CI	)										3.00 5.50		AB	C	Pi Pi	1700 1500				50 50		(6)(k) (6)	65 793/8	25¾ 23¾	32%†† 33%††	
25- 385 25- 385	AT AT AT AT AT AT AT	6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00	7.68 7.68 7.68 7.63 7.63 7.63 7.68 7.68 7.68 7.68 7.68 7.68 7.68 7.68	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	2222222222222	1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62 1.50-3.62		1340 1340 1340 1340 1340 1340 1340 1340	10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12 10.12	6.16 6.16 6.16 6.16 6.16 6.16 6.16 6.16	4 5 7 3 4 5 7	3.50 3.50 3.50 3.50 3.50 3.50 3.50 3.50	Own Own Own Own Own Own Own Own Own Own	Own Own Own Own Own Own Own Own Own Own	000000000000000	Mu Mu Mu Mu Mu Mu Mu Mu		AC AC AC as as as as as as	ACCACCACCACCACCACCACCACCACCACCACCACCACC	AC AC AC AC AC AC AC AC AC	45 45 45 45 45 45 45 45 45 45 45 45 45 4	DR DR DR DR DR DR DR DR DR DR DR DR DR D		31 31/4 42% 53/6 15/6 175 (15) Vwy 38% Vwy 51/6 Vwy 68% Vwy 51/6 Vwy 68% Vwy 51/6 Vwy 68% Vwy 51/6 Vwy 68% Vwy 51/6 Vwy 46% 49/4 49/4 49/4	27% 23 % 23 % (15) 175 (15) 623 % 323 % 31 % 551 4 323 % 323 % 323 % 555 4 4 5	36 % 0 40 % 0 41 ½ 0 41 ½ 0 41 ½ 0 57 ½ (15) 1 68 ½ (1	
09273 25248 66	AA AA	4.31		3 3	2	1.12-2.75 1.25-3.31 1.50-4.00	F	1035 1035 1035	7.00 9.50 10.50		3	2.47 2.87 3.37	AB AB	AB+ AB+ AB+		Pi Pi Pi	1800	Zen Zen Zen	ACB ACB	Mic Mic Mic	45	AL AL DA	Ele Ele Ele	49 16 51 1/8 68 16	2015 2158 26	30 13 34 18 405/8	
2313 2315		5.25	4.00	4	1	1.37-3.40 1.37-3.40	F	1045	9.00	4.67						Pi		AM	Pur	Pur	36	AL AL	Eie Eie	24.13 41¼	24 23	28.87 31¼	ĺ
12375 12375 12350 12350 12375 12375	Alu	4.84 4.03 4.03 4.84	4.00 4.47 3.20 3.20 3.56 4.00	3 3 4	222	1.18-3.45 1.18-3.70 1.12-2.62 1.12-2.87 1.18-3.20 1.18-3.45	FFFF	CNM CNM CNM CNM CNM CNM	8.00 8.00 7.75 7.75 8.00 8.00	5.31 5.31 4.20 4.20	2 2 5 5		AB AB AB	AB AB AB AB AB	000000	Pi Pi Pi Pi Pi	1650 1650 1650				48	DR DR LDA LDA LDA LDA	EHA EHA A-E1 A-E1 EGA EGA	20.1	16 <sup>5</sup> / <sub>8</sub> 16 <sup>5</sup> / <sub>8</sub> 21 21 22 <sup>7</sup> / <sub>8</sub> 22 <sup>7</sup> / <sub>8</sub>	361/4 361/4 321/2 321/2 36 36	-

### Automotive Diesel and Other

-										GENERA	L		-						1	VALVES
	ENGINE MAKE	from				ed			With Bare Engine	With St Acces		to 1	essure	sno	sno	ند الد	Ship We (L	ping ight b.)		
	MODEL	Built Under License	Designed for	Туре	Number of Cylinders Bore and Stroke (In.)	Cylinder Liners Type	Cycle	Piston Displacement (Cu. In.)	Maximum Brake Hp. at Specified R.P.M.	Max. Intermittent Hp. at Specified R.P.M.	Continuous Sustained Hp. at Specified R.P.M.	Compression Ratio	Max. Combustion Pr (Lb. per Sq. In.)		Weight per Continuous Hp. (Lb.)	Max. Torque in Lb. at Specified R.P.M.	Automotive or Industrial	Marine	Arrangement	Intake Port Diameter and Lift (In.)
	Hercules—Cont, DOOD DIX6 DIX6 DIXC DXH DXJH DWXC DWXC	Own Own Own Own Own	T,Tr,M,I,B Tr,M,B,R,T,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,I T,B,Tr,M,R,I T,B,Tr,M,R,I	TC TC TC TC TC	4-4\4x4\2 6-3\6x4 6-3\6x4 6-3\4x4\2 6-3\4x4\2 6-3\4x4\2 6-4\4x4\4 6-4\4x4\4	000000	4 4 4 4 4	255 249 260 298 298 358 404	79 2600 92 3000 77 2600 83 2600 99 2600 118 2600 135 2600	66-2600 78-3000 66-2600 71-2600 84-2600 100-2600 115-2600	53-1800 71-2400 51-1800 59-1800 66-1800	15.00 15.50	750 825 750 750 750 750	91 94 94 97	14.24 18.6 16.14 14.7 16.7 14.74	182-1400 192-1800 179.1300 208-1300 320-1300 284-1600 320-1600	750 780 950 950 980 1350 1350		VI VI VI VI VI	1.62 . 1.56 . 1.62 . 1.62 . 1.75 . 1.68 .
	Hercules DRXE DRXC DFXB DFXC DFXC DFXC DFXC DFXC DFXL DFXL DNX-V8 DNX-V8	Own Own Own Own Own	T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,M,Tr,I T,B,M,Tr,I T,B,M,Tr,I T,B,Tr,M,R,I T,B,Tr,M,R,I T,B,Tr,M,I M,I	TC TC TC TC TC	6-43-x514 6-43-x514 6-5x6 6-51-x6 6-51-x6 6-55-x6 6-55-x6 6-53-x6 8-61-x6 8-61-x6	000000000	4 4 4 4 4 4 4 4	474 529 707 779 855 895 935 1468 1468	132 - 2200 147 - 2200 190 - 2100 204 - 2100 217 - 2100 228 - 2100 260 - 2100 400 - 2100 500 - 2100	112-2200 125-2200 162-2100 173-2100 184-2100 194-2100 221-2100 340-2100 425-2100	89-1600 100-1600 136-1600 149-1600 162-1600 170-1600 •187-1600 278-1600 345-1600	15.00 15.00 14.80 14.80 14.80 14.80 14.80 14.80	750 750 750 750 750 750 750 750 750	0 95 0 95 0 94 0 94	18.06 16.06 18.4 16.8 15.46 14.76 13.86 15.1 13.9	340-1200 395-1200 530-1350 585-1350 645-1200 680-1200 750-1200 1100-1200 1320-1400	2500 2500 2500 2500 2575 4200		VI VI VI VI VI	2.00- 2.00- 2.37- 2.37- 2.37- 2.60- 2.87- 2.87-
		Own Own	M,1 M,1 M,1	PC PC PC	2-3½x5½ 4-3½x5½ 6-3½x5½	000	4 4 4	106 212 317	19 1500 41 1500 63 1500	17.3-1500 36.3-1500 55-1500	16.6-1500 33-1500 50-1500	16.0 16.0 16.0	0	85 85 85	64 44 37.5	69-1200 142-1200 225-1200		1300 1750 2300	VI	1.37- 1.37- 1.37-
	International UD8 UD9 UD14 UD18 UD18 UD18 UD18	Own Own Own Own Own	Tr.1 Tr.1 Tr.1 Tr.1 Tr.1 Tr.1 Tr.1	PC PC PC PC PC	4-374x514 4-4.4x512 4-434x612 6-4.4x5.5 6-434x612 6-534x7	DOWDWD	4 4 4 4 4	248 334 461 502	45.5-1500 55-1500 79-1400 103-1400 131-1600		31.2-1500 42.4-1500 60.8-1400 80-1800 100-1600 144-1375	14.2 14.4 15.5 16.6 15.5 15.2	0	66 67 75 70	38.9 35.0 30.0 27.3 28.3 12.2	154-800 209-800 325-900 330-1000 470-900 775-800	1215 1485 1825 2190 2825		VI VI VI VI	1.50- 1.66- 1.78- 1.66- 1.78- 2.31-
	Kermaih DIX DOC DJX DRX DFXE	Hercules Hercules	M M M M	TC TC TC TC	2-414x41/2 4-4x41/2 6-334x41/2 6-438x51/4 8-55/8x6	00000	4 4 4 4			27-1800 65-2600 84-2600 113-1800 215-1800	20-1800 49-2600 63-2600 85-1800 170-1600	15.5 14.5 14.5 14.5 14.5	0 50 0 50 0 47	0 64 5 79	43.5 24.5 21.5 24.7 24.5	81-1400 162-1400 208-1500 350-1300 680-1200		870 1200 1355 2100 3800	VI VI	1.62- 1.62- 1.62- 2.00- 2.37-
	Lister (1) CE	Lister Lister	M,1 M,1	PC PC	1-4½x43/8 2-4½x43/8	D	4		8.75-1200 17.5-1200	7.2-1200 14.4-1200	6.2-1200 12.4-1200	Δ	80		198.4 109.2	37-1000 73-1000		1230 1355		1.43-
	Murphy ME-4 ME-6 *ME-65 ME-66 ME-46	Own Own Own	M,I M,I M,I Mil	DI DI DI DI	4-534x61/2 6-534x61/2 6-534x61/2 6-6x61/2 4-6x61/2	W W W W	4 4 4	1013 1013 1103		105-1200 160-1200 200-1200 180-1200 115-1200	90-1200 135-1200 165-1200 150-1200 100-1200	17.0 17.0 14.0 17.0 17.0	0	. 107	47.7 38.5 35.7 34.5 43.0	472- 900 732- 850 960- 775 8.30- 800 5.53- 800	5200 5900 5200	7940 8190 7940	VI VI	1.62d 1.62d 1.62d 1.62d 1.62d
	Red Wing DO 42-54HP 55-60HP 65-75HP 100-125HF	Wau-Hes Wau-Hes Wau-Hes	M	TC DI DI DI	4-41/4 x41/2 4-4x5 4-45/8x51/4 6-33/4 x41/4 6-41/2 x51/2	D W W N	4 4 4	353 282	55-2200 62-1600 78-2800	75-2400 54-2000 59-1600 75-2800 125-2100	56-1600 43-1500 55-1400 59-1800 106-1500	5.6	0 50 0 50 0 50	0 65 0 65 0 69	25.6 21.8 22.0 17.0	182-1400 155-1000 230- 800 174-1400 383-1000		1100 1200 1300 1800	VI VI	1.62- 1.62- 1.75- 1.62- 1.87-
	Scripps 7000A,1A,2A,3A	Hercules Hercules	M	TC	4 41/4 x 41/2 6 4 x 41/2	D	4			68-2600 88-2600	52-1800 68-1800	14.5			23.1 21.1	185-1400 238-1500		1200 1435		1.62
	Sheppard		Tr,M,I M,I Tr,M,I Tr,M,I T,M,I	PC PC PC PC	1-3x4 1-414x5 2-414x5 3-414x5 6-414x5	N W W W	4 4 4	71.0 142 213	33-2000 50-2000	3.75-1800 12-1800 25-1800 38-1800 75-1800	3.50-1800 11-1800 22-1800 34-1800 67-1800	18.0 18.0 18.0	62 62	5 68 5 68 5 69	94.0 79.5 47.7 38.9 26.6	11-1500 55-1000 106-1200 161-1200 325-1200	875 1050 1325	1100 1500 1750	VI	1.09 1.37 1.37 1.37 1.37
	Sterling VD6 VD8 VD8 VD8 VB8 Viking DB4 Viking DB6 Viking DB6		M,R,I M,R,I M,R,I M,R,I M,I M,I M,I	TC TC TC		W W W W W	4 4 4 4 4 4	2714 3619 3619 665 998		325-1200 495-1200 440-1200 660-1200 90-1200 170-1500 230-1500	270-1000 410-1000 370-1000 550-1000 76-1200 114-1200 152-1200	14.0 14.0 14.0 11.8	00 100 00 100 00 100 00 75 00 75	0 75	33.9 24.4 28.9 21.6 50.7 45.6 45.0	1420 2155 1945 2890 475-1200 737-1000 940-1000	11900 4550 5950	9550 10250 11300 4400 5350	VI VI VI	2.37- 2.37- 2.37- 2.37- 2.19- 2.19- 2.19-
	Waukesha(14) 130HS (14) 130HL (14) VRZH 190DLE (13) 140HS (13) 140HK (14) 5WAKE (44) 6WAKE (14) BNKH (14) 6LH	Hes Hes Hes Hes Hes	Tr Tr Tr T,Tr,I I I T,I	DI DI TC DI TC DI TC DI TC	4-334x5 4-4x5 4-456x54 6-334x4 6-414x55 6-514x6 6-514x6 6-614x612 6-614x612 6-67x812 6-812x812	W W W W W W W W W	4 4 4 4 4 4 4 4 4 4	251 353 265 468 525 779 1197 1197 1196	59-1600 64-2200 114-2250 128-2250 168-2000 174-2000 202-1800 225-1600 226-1050	38-2200 44-2200 47-1600 53-1800 95-2250 109-2250 138-2000 148-2000 162-1600 185-1600 277-1050	28-1500 31-1500 41-1400 42.5-1800 67-1500 102-1400 106-1400 139-1300 152-1300 160-950 225-900	15.3 5.8 5.8 17. 5.6 5.2 16.3	0 50 0 50 8 75 0 50 50 50 5 75 60 50 50 50	00 65 00 71 00 75 00 74 00 80 00 77 00 71 60 83	24.84 22.74 25.64 21.04 21.04 21.04 23.04 22.34 38.84 47.86	155-1000 229-700 184-1200 342-1000 530-1200 550-900 811-700 845-900 1350-656	705 1050 1510 1550 2150 1865 3200 3400 6200		VI VI VI VI VI VI VI	1.62- 1.62- 1.75- 1.37- 1.87- 2.25- 1.87- 2.37- 2.37- 2.37- 2.50- 3.25-

### **ABBREVIATIONS**

- Without fan or muffler
  Based on automotive or industrial weight,
  all others on marine
  With full equipment but without radiator
  or fan

  Suppostbased to Includes piston pin
- \*—Supercharged †—Includes piston pin ††—From center line of crankshaft to top of
- engine
  -Includes structural steel mounting base
  and reduction gears
  -Includes muffler

- (10)—Cast iron to 1600 R.P.M., aluminum above 1600 R.P.M.,
  (11)—Includes radiator
  (12)—From bottom of pan to air cleaner mounting flange
  (13)—Automotive power ratings
  (14)—Including radiator and gear box
  A—Air (a)—Aluminum alloy
  AB—American Bosch or Ex-Cell-O Corp.
  A-El—Air or Electric
  AL—Electric Auto-Lite Co.
  Alu—Aluminum AM—Air-Maze Corp.
  as—Air Sileneer
  AT—Arma Steel, tin plated
  BB—Bendix or Bosch
  BP—Bosch or Purolator
  BP—Briggs Clarifier Co
  Bur—Burgess
  C—Cars
  C—Cars
  CB—Primary, Cuno; Secondary, Bosch
  C1—Cast Iron

1.33 1.63 1.63 1.63 1.63 1.63 1.63 2.13

1.3 1.4 1.5 1.4 1.5

### Heavy Oil Engines-Concluded

VALVES		PIS	TONS	8		PISTO			ODS	G	BE	AIN AR- IGS		SYS	STE						ane	11	RT- IG HOD		OVERALL	S	
Exhaust Port Diameter and Lift (In.)	Material	Length (In.)	Weight with Rings and Pin (Lb.)	No. of Compression Rings	of Oil Rings	meter	Locked in—	Material (S.A.E. No.)	Center to Center Length (In.)	Weight with Cap and Bushing (Lb.)	Number	Diameter (In.)	Make of Pump	Make of Valve	Valve Type-Open or Closed	80	Pressure—Nozzle Opening (Lb. per Sq. In.)	Air Cleaner-Make	Fuel FilterMake	Lubricant Filter-Make	Minimum Recommended Cetane Number of Fuel	Маке	Туре	Length—Fan to Flywheel (In.)	Width (In.)	Height—To Top of Air Cleaner (In.)	I ine Number
.12375 .12350 .12375 .12375 .31375 .25395 .25395	Alu Alu Alu Alu Alu	4.84 4.03 4.84 4.84 4.84	3.58	3 4 4 3 4	2 2 2	1.18-3.7 1.12-2.8 1.18-2.9 1.18-3.2 1.18-3.2 1.18-3.4 1.18-3.7	7 F 5 F 0 F	CNM CNM CNM CNM CNM CNM	8.00 7.75 8.00 8.00 8.00 8.50 8.50	5.31 4.20 5.31 5.31 5.31 7.31 7.00	7 7 7 7	3.00 2.75 3.00 3.00 3.00 3.50 3.50	AB AB AB AB	AB AB AB AB AB AB	CCCCCCC	Pi Pi Pi Pi Pi	1650 1650 1650 1650 1650 1650				45 45 45 45 45 45	LDA LDA LDA LDA LDA LDA LDA	EGA A-EI EGA EGA EGA EGA	32 <sup>1</sup> / <sub>16</sub> (2) 38 39 (2) 39 (2) 39 (2) 46 <sup>1</sup> / <sub>32</sub> (2) 46 <sup>1</sup> / <sub>32</sub> (2)	227/8 21 22.56 22.56 22.56 22.56 253/4 253/4	36 321/2 321/4 321/4 331/8 361/2 361/2	
.37395	Alu Alu Alu Alu	6.84 7.53 7.53 7.53 7.53 7.53 7.53	7.09 7.93 9.94 11.69 12.37 12.34 12.60 12.90	3 4 4 4 9 4 7 4 1 4 0 4	22222	1.62-3.9 2.00-4.1 2.00-4.4 2.00-4.6 2.00-4.6 2.00-4.9	3 F 2 F 5 F 5 F 0 F	CNM CNM CNM CNM CNM CNM CNM CNM	9.37 9.37 12.00 12.00 12.00 12.00 12.00 13.25 13.25	13.75 13.75 13.75	7 7 7 7 7	3.50 4.50 4.50 4.50 4.50 4.50 4.50 4.50	AB AB AB AB AB AB AB	AB AB AB AB AB AB AB	000000000	Pi Pi Pi Pi Pi Pi Pi	1650 2000 2000 2000 2000 2000 2000 2000 2				45 45 45 45 45 45 45	LDA LDA LDA LDA LDA LDA LDA LDA LDA	EGA EGA EGA EGA EGA EGA EGA	46 \( \frac{5}{16} \) (2) 46 \( \frac{5}{16} \) (2) 62 \( \frac{372}{372} \) (2) 62 \( \frac{372}{372} \) (2) 62 \( \frac{372}{372} \) (2) 62 \( \frac{277}{372} \) (2) 62 \( \frac{277}{372} \) (2) 57 \( \frac{5}{16} \) 67	27 27 305/8 305/8 305/8 305/8 305/8 42 42	383/8 383/8 481/6 481/6 481/6 481/6 553/4 553/4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
.37372 .37372 .37372	Lyn Lyn	4.87	2.83 2.83 2.83	3	2	1.50-2.7 1.50-2.7 1.50-2.7	2 F	4140 4140 4140	13.25 13.25 13.25	7.3 7.3	3 5 7		3 AB	A-E A-E	CCC	Pi Pi Pi	1800	Uni Uni AM	Fram Fram Fram	Cun	50 50 50	AL AL AL	Ele Ele	35 47½ 58	25 25 27	40 40 45	
.31500 .47500 .53532 .41532 .53532 .87625	AA AA AA AA AA	5.70 6.44 6.19 6.44	4.41 6.28 7.36 6.28 7.36	3 3 3 4 5 3	2 2 2 2 2 2	1.31-3.3 1.50-3.3 1.62-4.1	25 F 71 F 10 F 71 F	1040 1040 1040 1040 1040 1040	10.00 11.00 13.25 11.00 13.25 13.25	8.01 10.83 11.81 9.10	5 7 7	4.1 3.2 3.5 3.5	5 Cwn 2 Cwn 5 Own 6 Own 0 Cwn 2 Own	Own Own Own	CCCC	Si Si Si Si	700 700 700 700	Den Don Don Don Den Don	Pur Pur Pur Pur Pur	Pur Pur Pur Pur Pur		Own Own Own	Ha Ha Ha Ha GS	38½ 41½ 47⅙ 57⅙ 60¼ 70	23 24 27 <sup>1</sup> / <sub>4</sub> 28 <sup>1</sup> / <sub>6</sub> 29 <sup>1</sup> / <sub>4</sub> 30 <sup>1</sup> / <sub>2</sub>	39 <sup>3</sup> / <sub>16</sub> 42 <sup>1</sup> / <sub>2</sub> 47 <sup>1</sup> / <sub>8</sub> 44 <sup>1</sup> / <sub>2</sub> 49 <sup>1</sup> / <sub>4</sub> 54 <sup>5</sup> / <sub>8</sub>	
.12375 .12375 .12375 .37395 .62500	Alu Alu Alu	6.84		0 4 6 4 9 4	2 2 2			CNM CNM CNM CNM	8.00 8.00 8.00 9.37 12.00	5.31 5.31 8.59			AB AB AB AB	AB AB AB AB	CCCCC	Pi Pi Pi Pi	1650 1650 1650	AC AC AC AM AM	Pur Pur Pur Pur Pur	DeL Pur Pur Pur Pur		DR DR DR DR DR	Ele Ele Ele Ele	41 % 473/4 54 11/6 60 16 88 3/6	23 22½ 22½ 27½ 2758 34¼	30 <sup>5</sup> / <sub>8</sub> 33 33 37 <sup>13</sup> / <sub>13</sub> 54 <sup>8</sup> / <sub>8</sub>	
.28380 .28380		5.50 5.50			1	1.50-3. 1.50-3.	75 F 75 F	1045 1045	8.50 8.50	5.37 5.37	7 4	2.3	7 AB 7 AB	AB AB	C	Si Si	2000	Don'		Brg*	43 43	Own Own	Ha Ha	40 <sup>3</sup> / <sub>8</sub> 46 <sup>3</sup> / <sub>8</sub>	20 23	33½ 36½	
.62d-,500 .62d-,500 .62d-,500 .62d-,500 .62d-,500	GI GI GI	7.75 7.75 7.75 7.75 7.75	21.5 21.5 23.5	9 4 2 4 3 4	2 2	2.12-4. 2.12-4. 2.12-4. 2.21-4. 2.12-4.	73 F 73 F 88 F	1035 1035 1035 1035 1035	12.50 12.50 12.50 12.50 12.50	14.7	7 7 7 7 7	4.0 4.0 4.0	0 Cwn 0 Own 0 Own 0 Own 0 Own	Own Own	CCC	Mu Mu Mu Mu	1500 1500 1500	Den Den Den Den Den	OP OP OP OP	Pur Pur Pur Pur	50 50 50 50 50	DR DR DR DR	Ele Ele Ele Ele	56 \( \frac{7}{16} \) 73 \( \frac{7}{16} \) 75 \( \frac{1}{4} \) 73 \( \frac{7}{16} \) 56 \( \frac{7}{16} \)	37 37 37 37 37	6015 5718 5115 5718 6015	
.12375 .25453 .50450 .25375 .37469	CI CI Alu	4.84 5.12 5.96 4.87 6.50	4.30 6.00 2.50	0 3 6 3	1	1.18-3. 1.12-3. 1.31-4. 1.00-3. 1.37-3.	06 F 06 F 50 F	CNM 1045 1045 1045 1045	8.00 8.75 10.50 8.00 10.25	3.56 5.30 3.50	3 3 7	3.0 2.6 2.3 2.6 3.2	2 AB 7 AB 2 AB	AB Hes Hes Hes	0000	Pi Mu Mu Mu			Pur Mic Mic Mic Mic	Pur Mic Mic Mic Mic	45 60 60 60	LN DR AL DR DR	Ele Ele Ele Ele	50 <sup>8</sup> / <sub>8</sub> 48 <sup>1</sup> / <sub>16</sub> 52 <sup>13</sup> / <sub>16</sub> 53 <sup>13</sup> / <sub>16</sub> 78 <sup>8</sup> / <sub>8</sub>	28 <sup>3</sup> / <sub>4</sub> 24 21 <sup>1</sup> / <sub>4</sub> 23 <sup>1</sup> / <sub>8</sub> 29	35 16 33 16 38 1/8 31 1/8 41 16	
.12375 .12375		4.84 4.84				1.18-3.		CNM	8.00			3.0	0 AB	AB AB	C	Pi Pi	1650 1650	AC AC	Pur Pur	Pur Pur	45 45	DR DR	Ele Ele	465/8 5316	241/4 241/4	223/4 223/4	
09209 37313 37313 37313 37313	CI CI CI	5.46 5.93 5.31	6.2	0 3 0 3 0 3	2 2 2	1.06-2. 1.50-4. 1.50-4. 1.50-4. 1.50-4.	00 F	1035 1035 1035 1035 1035	8.00 10.87 10.87 10.87	6.60	0 2 3 0 4	2.7	C Own 5 Own 5 Own 5 Own 8 Own	Cwn	000	Si Si	1	MAI AM I	Fra Fra Fra Fra Fra	Fra Fra Fra Fra Fra		AL AL AL AL	E-H Opt Opt Ele Ele	18 <sup>1</sup> / <sub>8</sub> 23 30 35 50	20 <sup>3</sup> / <sub>4</sub> 23 23 23 24	28½ 38 38 38 40	
.37 .525 .37 .525 .37 .525 .37 .525 .37 .525 .81 .536 .81 .536	5 Alu 5 Alu 5 Alu 6 CI	10.25 10.25 10.25 10.25 8.00 8.00	30.5	9 3 9 3 9 3	2 2 2 2 2	3.00-6. 3.00-6. 3.00-6. 3.00-6. 2.12-4. 2.12-4. 2.12-4.	93 F 93 F 93 F 93 F 50 F	1040 1040 1040 1040 1040 1040 1040	18.00 18.00 18.00 18.00 14.25 14.25	46.08 46.08 46.08 19.11	5 7 5 9 5 9 1 5	6.0 6.0 4.5 4.5	0 BB 0 BB 0 BB 0 AB 0 AB	EB EB EB EB AB AB	CCCGCCC	Pi Pi Pi	3000 3000 3000 1600	Opt Opt Opt Opt Bur Bur	Win Win Win Del Del Del	Mic Mic Mic Com Com	50	LN LN	A-EI A-EI A-EI Ele Ele Ele				
.25	CI CI CI CI Alu Alu I Alu I Alu I Alu I Alu I CI CI	5.12 5.12 5.96 4.18 6.50 6.50 7.25 7.25 8.37 3.37	3.60 4.30 6.00 3.79 4.00 6.44 11.00	0 3 0 3 0 3 5 3 0 3 4 4 3 3 3 3 5 3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.12-3.0 1.12-3.0 1.31-4.0	06 F 06 F 06 F 00 F 00 F 00 F 00 F 00 F	1045 1045 1045 1045 1045 1045 4145 1045 4145 1045 10	8.75 8.75 10.50 6.75 10.25 11.75 11.75 13.25 13.25 15.37 20.87	3.56 3.56 5.31 5.31 5.31 12.20	3 3 3 4 7 7 7 7 7 7	2.6 2.6 2.3 2.6 3.2 4.2 3.5 4.0 4.7 3.7	2 AB 22 AB 27 AB 55 AB 56 AB 56 AB 56 AB 56 AB	Hes Hes AB Hes Hes Hes Hes Hes	000000000000000000000000000000000000000	Mu Mu Pi Mu Pi Mu Pi Mu Pi Mu	750 750 750 750 750 750 2000 750 2000 780	Opt	Mic Mic Fra Mic Com Mic Com Mic Com Mic Mic Mic	Mic Mic Mic Mic Mic Mic Mic Mic Mic HC	45	Opt Opt Opt Opt Opt Opt	Ele E-G	33 % 33 % 33 % 33 % 33 % 33 % 33 % 33	211/2 211/2 253/4 22 211/3 253/4 253/4 305/6 323/8 461/2	3834 3884 3476 2976 41136 41136 4636 46378 5078 5078 5078	

Com—Commercial Filters Corp.
CNM—Chrome-nickel molybdenum
Cun—Cuno Engineering Corp.
(d)—Dual D—Dry liners used
DA—Delco-Remy and Auto-Lite
Del\_Law Products Corp.
DI—Direct injection
D-N—Delco-Remy or Novo
Don—Donaldson Co.
DR—Delco-Remy Div.
DRW—Delco or Waukesha
EAH—Air, Electric or Hand
EGA—Electric aux. gas engine or Hand

E-G—Electric or auxiliary gasoline engine
E-H—Electric or hand
Ele—Electric
Exc—Ex-Cell-O Corp.
F—Floating
Fra—Fram oil filter
G—Auxiliary gasoline engine, electric optional
Gl—Crey Iron Casting
G. M. Gorp.—General Motors Corp.
GS—Gasoline and spark ignition
Ha—Hand
HC—Honan-Crane Corp.
Herc—Hercules Motor Corp.
Hes—Heselman
Ind—Indiana Wire Cloth Prod. Corp.
(k)—Hand start optional on 1, 2 and 3 cyl.

LB—Leece Neville or Buda
L—D—Leece-Neville, Delco-Remy Autolite
LE—Lanova energy cell
LM—Leece Neville or Buda
LD—Leece Neville or Buda
LD—L

Pur—Purolator Products, Inc.

R—Locked in Rod

R—Railcars

Sh—Shaft torque; Shaft RPM

Si—Single

I—Trucks

TC—Turbulence chamber

Ir—Tractors

Uni—United Air Cleaner Div.

Vi—Vertically In-Head

Vik—Viking

V2—Vertically in head, 2 inlets used

Vor—Vortex

W—Wet liners used

Vor—Vortex

Wau-Hes—Waukesha-Hesselman

WGB—WG.B. Oil Clarifier, Inc.

Win—Winslow Filter

Zen—Zenith

PS 24.62 20.58 29.56 EM 29.56 22.53 32.00

163 2.50 1-MS FL Soin DR 207 2.07 1-MS FL Soin DR

73 1.00

75 2360

250 St. 4.384x334 144.5 8.80, 140 No (1) | 1 | 1 | 1 | 68 2550 St. | 88 2550



Control March   Control Marc	
Character   Char	44444
Charles   Cooling Machine	
March DATA   Mar	April a series
Compared by Comp	0.00000
Column   Marine   Column   M	33.0
Manual Accordance   Manu	00000
Continued   Cont	E E E E E
PATHON   P	Scin Scin Scin Scin
Charter   Char	
PATRICA   1	H S H S H S H S H S H S H S H S H S H S
Confine Marie   Confine Mari	22.49
CENERAL DATA   Confing Medium   Confin	312 312 335 346 362
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ENGINE MAKE  AND MODEL  Cameron (2) C4-1-E-1  CBS-12F	K-5 B-5 B-54 5, Series 2 R-55
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AND MODEL AND CORR & L (C90	
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Lycoming (3)	Pratt & Whi

# Method of Starting ABBREVIATIONS FOR AIRCRAFT ENGINES Carburetor Type F-FI-Float or fuel-injection. FL-Float. PI-Pressure Injection. A-Speed density pump. V-Excello fuel injector. IM-Impeller injectior.

Propeller Drive

-.666 Optional. 2-.4375 Optional.

Carburetor Make

Ben-Bendix-Stromberg.
MS-Marvel Scheller.
OF-Own, fuel injector.
SH-Stromberg or Holley.
SM-Stromberg or Marvel-Schebler.
STR-Stromberg or Marvel-Schebler. Cylinder Material

(1)—Nicke liron with Alumium bead.
(2)—Alumium with steel liner.
(5)—Steel with Alumium bead.
(6)—Alumium with cast iron sleeves.
(9)—Alumium with cast iron sleeves. Valve Location In-In-head with push rods and rocker sleeves. (10)—Steelbarrel with aluminum fins cut in aluminum muff and bonded.

L—Low Blower.

(a)—2400 bp with water injections.

(b)—Take-off with high-speed super-charger drive and water injection.

(c)—1800 bp with water injections.

Ratings H-High Blower.

St. Sea Level.

OH-Overhead camshaft.

AL-Auto-Lite Ecl-Eclipse

EM—Electric Motor.

HE—Hand Crank or Electric Motor.

pt—Optional.

PC—Pulling Cable.

PS—Propeller Swing. Engine Manufacturers Starter Make
-Lite DR-Delco-Remy
Opt-Optional Bos-Bosch.

DR-Delco-Remy ES-Edison-Splitdorf
Eis-Eisemann

Ignition System Make

(1)—Aircooled Motors, Inc. (2)—Cameron Aero Engine Corp. (3)—Avisiton Mfg. Corp. Lycoming Div. (4)—Gladden Products Corp.

(a)-A longitudinal type mounting

provided by four mounting bosess integral with the crankcase.

(1)—A rear type mounting is provided by four mounting bosses integral with the crankcase ections.

(u)—A rear type mounting is provided by five mounting is provided by five mounting is provided by five mounting the crankcase sections, and the remaining boss is located at the rear of the oil sum.

—Vert., 11½. Hor. (Upper), 7". Hor. (Lover), 104%.

VM—Model B4 same as B5 except it is mounted vertically for helicoopter

General

- Equipped with SAE # flanged propeller shaft, available only on special request.

- Equipped with SAE #20 splined propeller shaft.

- One engine-driven fuel pump standard equipment with each engine.

(a)—Cooled by fan.

(a)—Approved for gilder use.

(d)—Approved for gilder use.

(d)—Approved for gilder use.

I-q—Liquid cooled.—Also a ratio of 3836

Cylinder Arrangement

Hor—Horizon ally opposed.

II—In-line.

Rad—Kadine.

75.0 153 Rad Air 5.6x523 640.0 5.50 127 No (5) 1 1 In 160 1850 SL 160 1850 III 100 1850 SL

ES



# AMERICAN OUTBOARD MOTORS

1	Lubrication—Pints Oi	%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%	nankkan an nank k nankana wat	-Martin Motors Div., National Pressure Cooker CoKitchafer CorpMunic Gear Works, IncGoodyear Tire & Rubber CoMontgowery Ward -Atlas Supply Co.
	Reverse	>>ZZZZZ>>ZZZZ	Z< <>< <>X< <>XX << <>XX <><>XX << <>XX << <>XX << <>XX <><>XX << <>XX << <>XX <><>XX << <>XX <>< <>XX << <>XX <	r., Na
	Cooling System	\$	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB	rs Div
	Exhaust—Type	55555555555	555555555555555555555555555555555555555	Moto Cook efer C Gear Gear ar Tin
sign	Connecting Rod	>>5555555>>		artin essure Kiekha Auncie foodye footgo
Bearings	nisM			(9)—M Pr. (10)—F (11)—M (12)—C (13)—N (14)—A
			7::	
	Spark Plug—	CH-7 AL-C13 AL-C13 AL-C13 AL-C13 CH-H10-J CH-H10-J CH-M6-J CH-M6-J CH-M6-J	OWN-FSOLF OWN-FS	Yes  Champion Motors Co. West Bend Aluminum Co. Evirunde Motors Division  Solt-Awaten Mig. Co., Inc. Metal Products Cor.  Actamble Stogram Inc. Johnson Motors  Johnson Div., Hart-Carter Co.
	Starting Mixture  —yd benistdO	555555544455	655226666666666666666666666666666666666	nd Ah nd Ah oducts oducts oducts oducts oducts oducts oducts oducts
etor	beed wold from suibA	****	***********	es Champio West Be Evinrude Scott-At Metal Pr Gamble S Johnson L
Carburetor	Size (In.)	2570 748 748 748 748	######################################	1000
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	Ignition System Type			
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	Gearcase Bearing	889989999	33555335555555555555555555555555555555	d Valve tor Rub y Pumi iding Ra iding Ra y Valve on Cark water rri
	(.oN.3.A.2) IsinateM	4140 X1515 X1515 X1515 X1515 X1515	NESS40 NESS40 NESS40 A615 A615 A616 A616 A616 A616 A616 A616	V—Ree —Rotla —Rewin —Rotar —Tillots —Under —Vactu
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(.esf	Fuel Tank Capacity (P	3.555 3.555	888888845688867478888488444888848884888848	de ye
	Starting Device	E COO SERVICE COO	A STATE OF THE STA	18g—Magneto 19g—Magneto 19g—No or None 19g—Oilite bearings 19g—Opposed two cy 19g—Plain bearing 19g—Primer Vacuut 19g—Ressure Vacuut 18g—Rectary and Bost
	Number of Blades	~~~~~~~~~		Mag—N Nu—M N—No Ol—Oil O-2—O Pl—Pla Fr—Prin FR—Prin RB—R
Propeller	Pitch	20 24 27 24 7 2 5 E	979 977 800 7 877 805 977 800 977 800 978 978 978 978 978 978 978 978 978 978	SSZÖÖZĞĞ
P	Diameter (In.)	##### ×####	20	c Co. valve Bronze
	Piston Rings— AlbiW bns TedmuM			ark Plug e poppet
	Engine Weight (Lb.) Fully Equipped	23.29.29.29.29.29.29.29.29.29.29.29.29.29.	V620428448844887488488488488488488488488488488	e and Fle
	Brake Hp. at R.P.M. O.B.C. Rating	4.2-4300 8.5-4200 1.3-4000 3.5-4000 2.0-3500 2.0-3500 8.7-4000 8.7-4000 33.4-4000	3.6.4000 5.1.4000	CF—Choke and Flood Ch—Choke CH—Champion Spark Plug ( CH—Champion Spark Plug ( Ch—Cam operated poppet v Ch—Cam operated poppet v Dab—Die Cast Aluminum B Ef—Elseuan
	Engine Type	AF AFF 0-2 0-2 0-2	A A A A A A A A A A A A A A A A A A A	621 lain on ion on
	Piston Displacement (Cu. In.)	5.84 12.43 2.43 7.52 10.61 15.0 3.75 9.70 15.0 30.0	6.21 6.21	611 and earings p antifrict ing
	Bore and Stroke (In.)	22,000,000,000,000,000,000,000,000,000,	2994111	Connecting rod bearings plain on Piston Pin end, antifriction on Crank Pin end, antifriction on Annitration bearing AF—Alterate Firing AI—AII State Be—Plain and anti-friction bearing co-controvers.
	Number of Cylinders			Con Pis Cra
	Power Head	RV-2 Port RV-2 Port Re.V-2 Port Re.V-2 Port Re.V-2 Port Ch.V- RV- RV- RV-	Ch-V.2 Port Ch-V.2 Port Ch-V.2 Port Ch-V.2 Port Ra.V. Par. V. 2 Port RV. 2 Port Ch-V.2 Port RR.V.2 Port Ch-V.2 Port RR.V. Ch-V.2 Port Ch-V.3 Por	for 521 21, 611 521 and 621 for 621
	MAKE AND MODEL	Elgin (2) 571.58301 44K Elgin (2) 571.58301 571.58601 57	Table   Tabl	*—110 Commercial J  *—59parate crankcase  *—57% for model 511, 433, for 521  *—Rewind on models 511, 521, 611  *—Rewind on models 51 and 521  *—Meverse on models 521 and 621  *—Ally for model 911, 463, for 821  *—Ally for model 911, 463, for 821

v-4114 for model 611, 4614 for 621 Co-Centrifugal Friction bearing Fi-Flooding

# BRITISH AIRCRAFT ENGINES



(14) -Atlas Supply Co.

(6)—Gamble Skogmo Inc. (7)—Johnson Motors (8)—Jauson Div., Hart-Carter Co.

Vac—Vacturi
VP—Vane Pump

PV Pressure Vacuum RB-Rotary and Booster Valve

		Height above En	18.7	25	0000	888	31	39	0.03 21 21 22 25 25 25 25 25 25 25 25 25 25 25 25	.3 12.38	888888
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ions Ins.)		Width	41.5	47.7	7.7.7				20.77.7.19.19.	39	23322
Dimensions (Overalf—Ins.)		.d.O To IngieH	41.5	47.7	25.6 31.4 31.4	52.0 52.0 52.0	55.3	55.3	30.62 32.24 32.24 33.05 33.05	48.0	43.55 65.55 65.55 65.55 65.55
0		Гепдін	52.8	49.6	39.9 39.9 43.1	40.9	49.0	53.3	45.04 43.04 49.74 56.34 64.24 63.54	82.2	89.0 102 79.0 86.0 86.0
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etor		Type	ā	7	2222	222	=	<u>-</u>	44444	<u>a</u> <u>a</u>	22422
Carburetor		Number Used and Make	1-Hob	1-Hob	1-Zen 1-Zen 1-Hob	1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-1-69 1-69	1-Hob	1-Hob	1-1-1-1 1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	1-Hob	1-SU 1-SU 1-SU 1-SU
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(Lb.)		Engine Dry W Hub or Starter	760	802	234 327 333	1930† 1 2060 2345† 1	2800	31701	312 340 410 510 660 660	2490	1720 1780 1740 1740
	-	Propeller Drive	.500	.732	2000	440	400	400	E	274	420 420 420 420
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-0	oil	Compression Ra	6.80	6.35	6.25 6.25 6.50 6.50	7.00	7.20	8.00	66.55.50	7.00	888888
-0	place	Total Piston Dis ment (Cu. In.)	719	835	243 243 386 386	2360 2360 2360	3270	3270	373 414 414 621 621 621	2238	1649 1649 1649 2239
(	sabr .nf) (	Number of Cylic Bore and Stroke	9-4.80x4.41	7-5.25x5.50	4-3.94x5.00 4-3.94x5.00 4-4.72x5.50 4-4.72x5.50	14-5.75x6.50 14-5.75x6.50 14-5.75x6.50	18-5.75x7.00	18-5.75x7.00 Blower	4-4.64x5.51 4-4.73x5.91 4-4.73x5.91 6-4.73x5.91 6-4.73x5.91	24-5.00x4.75 Blower 24-5.00x4.75 Blower	12-5.40x6.00 12-5.40x6.00 12-5.40x6.00 12-5.40x6.00 12-5.40x6.00 12-6.00x6.60
		nuibeM gniloo3	Air	Air	<b>ZZZZ</b>		0 0	Air B	*****	Liq B	33333
		Arrangement	Rad	Rad	====	6	Rad	0 0	22222	H 2 S	0099999
-		ENGINE MAKE AND MODEL	Alvis Ltd. *Leonides 501-1, 2, 3, 4	Armstrong Sid Cheetah N.k 15-Mk 25	rn Cirrus Minor-2A Cirrus Minor-2A Cirrus Major-2 Cirrus Major-3	Hercules 630-639 Hercules 230-730 Hercules 762-763	Centaurus 57	Centaurus 662-663	land Gipsy Major 10 Gipsy Major 30 Gipsy Major 50 Gipsy Queen 30 Gipsy Queen 70 Gipsy Queen 70	Sabre VA	Merlin 134-135 Merlin 140 Merlin 620 Merlin 621 Merlin 621 Griffon 74
		ENGINE AND M	Alvis Ltd. *Leonid	Armstrong SidCheetah	Blackburn Gi	Bristol He		Cent	DeMavilland G	Napier	Rolly-Royce

	4	
ONS	501-1.	
ATI	for	
Ĕ	are	-
<b>ABBREVIATIONS</b>	shown	
	)ata	

Models 2, 3, and 4 vary only in propeller f-Includes Torquemeters, which indrive ratio, weights and length creases weight by 35 lbs.

(a)—Also 9.49 Blower Ratio (b)—Also 7.06 Blower Ratio (c)—Also 6.79 Blower Ratio (f)—Also 3.67 Blower Ratio (f)—Also 3.67 Blower Ratio BTH—British Thomas-Houston Co. 4-From propeller center line to rear of +-Sleeve vales, with one stainless stee sleeve per cylinder

5-Steel with Aluminum Head 9-Aluminum Alloy

> -Sleeve valve engine with 3 inlet and -With Water-Methanol injection 2 exhaust ports engine

2-Aluminum with steel liner

BT-R-British Thomas-Houston or Rotax

Car—Cartridge
Cof—Cofman
Dir—Direct
EM—Electric motor
FL—Float
M—Horizontally opposed

I-In head with push rods and rocker H-I-Hobson injector
Hob-H. M. Hobson Components, Ltd. M-E-Hand or electric motor

Liq-Liquid
OH-Overhead valves IL-In line arms

OS-Own or S. U.

Pls-Pleasey
PI-Pressure Injection
Rad—Radial
Rot-Rotax, Ltd.
SS-Single sleeve
SL-Sea level
Zen-Zenith

2700

‡-Model Mk 25 has take-off of 475 at



# BRITISH DIESEL AND OT

										GENER	RAL							
	ENGINE MAKE AND	License from			ers In.)	Type		ıt	With Bare Engine	Acces	tandard sories	_to 7	Sq. In.)	nous	snor	1	Ship	oping it (Lb.)
Line Mumber	MODEL	Built under Licens	Designed for	Type	Number of Cylinders Bore and Stroke (In.)	Cylinder Liners—7	Cycle	Piston Displacement (Cu. In.)	Max. Brake Hp. at Specified R.P.M.	Max. Intermittent Hp. at Specified R.P.M.	Continuous Sustained Hp. at Specified R.P.M.	Compression Ratio	Max. Combustion Pressure (Lb. per 9	B.M.E.P. at Continuous Hp. (Lb. per Sq. In.)	Weight per Continuous Hp. (Lb.)	Max. Torque in Lb. at Specified R.P.M.	Automotive or Industrial	Marine
1 2 3 4 5 6 7	A.E.C. (1)	Ricardo	M M T,B,Tr,R T,B,Tr,R B M T,Tr	TC TC DI DI AC AC	6-4.72x5.59 6-4.72x5.59 6-4.13x5.74 6-4.72x5.59 6-4.33x5.62 4-3.25x4.13 4-3.25x4.13	000000	4 4 4 4 4 4	587.9 587.9 463.0 587.9 498.0 137.1 137.1	95–1800 125–1800 100–1700	125-1500 125-1500 30-2000 45-2600	100-1500 100-1500 30-2000 40-2400	16.00 16.00 16.00 16.00 16.00 17.50 17.50	900 900 1000 1000 980 980	91.5 91.5 108 110 93.5 86.5 104	32.8 15.8 13.4 47.1 13.7	360-1200 360-1200 330-1150 430-1000 337-1200 87-1700 90-2400	1500 1670 550	3280*
8	Crossley (4)HOE-Type 7		В	DI	6-4.50x5.50	D	4	525.0		100-1700	82-1200	15.70	900	101	17.7	366-1000	1456	*****
9	Daimler (5) CD6-MKIV	Own	T,B	DI	6-4.50x5.50	D	4	524.8	********	100-1600		15.00	1140	100		350-1200	1720	
0	Dennis (6)	Own Own	T,B,Tr T,B,Tr	DI DI	4-4.62x5.90 6-4.13x5.74	W	4	396.8 462.9	80-1800 100-1800	77-1800 97-1800	64-1800 80-1600	14.00 15.00	1000 1000	79.8 85.5	23.6 21.0	262-1000 352-1100	1512 1687	
2 3 4	Leyland (7) O-300		T,B,Tr,M,I T,B,Tr,M,I T,B,Tr,M,I	DI DI DI	6-3.80x4.50 6-4.37x5.00 6-4.80x5.50	DDD	4 4 4	306.0 597.0 597.0	75-2000 100-1800 130-1800	67-2000 90-1800 115-1800	51-1600 74-1600 94-1600	16.00 15.75 15.75	1000 1000 1000	100 100 100	18.3 21.5 17.2	210-1100 410-900 410-900	934 1595 1625	934 1595 1625
5	Meadows (8)4DC-420 6DC-630	Own Own	T,B,M,R,I T,B,M,R,I	DI	4-5.12x5.12 6-5.12x5.12	D	4	421.2 633.0	85-1900 130-1900	80-1900 125-1900	66-1600 100-1600	15.50 15.50	1000 1000	102 102	18.5 15.6	245-1000 420-1000	1223 1568	1667 2125
7 8 9 10 11 12 13	Perkins (9) Vehicle-P4 IndustP4 Vehicle-P6 IndustP6 Marine-P6 Marine-S6 IndustS6	*******		TC TC TC TC TC	4-3.50x5.00 4-3.50x5.00 6-3.50x5.00 6-3.50x5.00 6-3.50x5.00 6-4.37x5.00 6-4.37x5.00	0000000	4 4 4 4 4	192.4 192.4 288.6 288.6 288.6 451.0 451.0	46-2200 34-1500 70-2200 52-1500 65-2000 100-2000 80-1500		67-2200	16.50 16.50 16.50 16.50 16.50 16.50 16.50	900 900 900 900 900 950 950	86.1 93.5 87.5 95.2 88.3 97.9 93.7	11.3 25.2 10.3 22.8 15.0 13.2 16.8	123-1250 123-1250 184-1250 184-1250 180-1300 274-1500 265-1300	4904 784 696 1120	980 1325
4	Thornycroft (10)TR6	*******	Ţ	PC PC	6-3.56x4.12 6-4.12x6.00	D	4	246.5 480.6	65-2100 100-1750	********	64-2100 98-1750	18.20 16.00	1070 915	99.0	16.6 17.1	164-1550 322-1200	1068 1680	

ABBREVIATIONS

--Includes reverse and reduction gears

--3% Nickel H.T.

--To top

--No flywheel

--Exclude Flywheel, Fly. Hsg. and starter ring

"—To face of flywheel
AC—Air chamber
Ala—Aluminum alloy
Aly—Alloy
B—Busses
C—Car

C—Closed
CI—Cast Iron
C-S—C.A.V. or Simms
D—Dry liners used
DI—Direct injection
Ele—Electric

F—Floating
H-E—Hand or electric
L—Industrial
Ley—Leyland
M—Marine
Mu—Multiple

Intake Port Diameter

VI 1.73-VI 1.73-VI 1.49-VI 1.57-VI 1.62-VI 1.28-VI 1.28-

VI 1.75 VI 1.81-

VI 1.31-VI 1.30-VI 1.90-VI 2.12-VI 2.12-VI 2.12-

VI 1.40 VI 1.40 VI 1.40 VI 1.40 VI 1.40 VI 2.00 VI 2.00

VI 1.4 VI 1.6

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### Registered Civil Aircraft by Major Manufacturers\*

(Includes Experimental Aircraft)

7-4	nber of rcraft		umber of Aircraft	Manufacturer Number	
Aeronca Aircraft Corp	12,456	Fairchild Aircraft Division	. 5.796	Perth-Amboy Title Co 13	36
American Aeronautical Corp	12	Fleet Aircraft, Ltd		Piper Aircraft Corp 19,00	07
Aircraft Mechanics, Inc	106	Ford Motor Co		ricalli Autoglio Collini	47
American Aircraft Co	15	Funk Aircraft Co		republic Aviacion Corp	20
American Airplane and Engine Corp.	15	General Aircraft Corp			13
American Eaglecraft Co	36	General Airplanes Corp		Hood Allorate Committee and the committee and th	11
Applegate & Weyant Eng. Corp	51	Globe Aircraft Corp		nyan Acionaucioai Co	28
Arrow Aircraft and Motors Corp	39	Goodyear Aircraft Corp			36
Barnard Aircraft Corp	17	Great Lakes Aircraft Corp		SIOUX AIRCRAFT CORP	15
Beech Aircraft Corp	1,484	Grumman Aircraft Eng. Corp		SHCK AITWAYS	10
Bell Aircraft Corp	77	Harlow Aircraft Co		Spartan Anciait Co	64
Bellanca Aircraft Corp	455	Hartmann Aircraft Corp		Star All Clait Col D	18
Boeing Aircraft Co	45	Howard Industries, Inc	. 327	State Securities Co	59
Boeing Airplane Co. (Stearman)	3,899	Inland Aviation Co	. 10	Stearman Aircraft Co	88
Brewster Aeronautical Corp	176	Johnson Aircraft, Inc	. 16	Swallow All plane Co	50
Buhl Aircraft Co	46	Kellett Aircraft Corp		Taylorcraft, Inc 8,0	
Call Aircraft Co	15	Kinners Motors, Inc	. 48	Timm Aircraft Corp	81
Cessna Aircraft Co	7,242	Laird Airplane Co	. 21	United Aircraft Corp.	60
Command-Aire Co	77	Lockheed Aircraft Corp	. 394	(SIKOTSKY DIV.)	60
Commonwealth Aircraft, Inc	571	Luscombe Airplane Corp	. 3,945	Oniversal Modified Products Corp	83
Consolidated Vultee (Stinson Div.)	4,584	Glen L. Martin Aircraft Co	. 2	VIKING FIVING BOAL CO	15
Consolidated Vultee Aircraft Corp	5,094	Meyers Aircraft Co	. 95	Waco Aircraft Co 1,6	24
Culver Aircraft Corp	666	Moth Aircraft Corp	. 40	White Aircraft Corp	24
Curtiss-Wright Corp. (Airplane Div.)	827	Naval Aircraft Factory	. 467	Total 91,33	26
Davis Aircraft Corp	27	Nicholas-Beasley Airplane Div		Miscellaneous Makes	31
Detroit Aircraft Corp	11	Noorduyn Aviation Ltd		Gliders and Lighter-than-air 6	87
Douglas Aircraft Co., Inc	1,613	North American Aviation, Inc			44
Engineering & Research Corp	4,217	Northwestern Aeronautical Corp	. 562	Total—All Types 92,6	44

### OTHER HEAVY OIL ENGINES



	VALVE	S		PIST	ONS			PISTON P	IN		NNECTI RODS	NG	B	IAIN EAR-	IN	JECTIO		YSTE	M	STAR		D	OVERA IMENSI	LL	
Arrangement	Intake Port Diameter and Lift (In.)	Exhaust Port Diameter and Lift (In.)	Material	Length	Weight with Rings and Pin (Lb.)	No. of Compression Rings	No. of Oil Rings	Diameter and Length (In.)	Locked in-	Material (S.A.E. No.)	Center to Center Length (In.)	Weight with Cap and Bushing (Lb.)	Number	Diameter (In.)	Make of Pump	Make of Valve	Valve Type, Open or Closed	Orifices	Pressure-Nozzle Opening (Lb. per Sq. In.)	Make	Туре	Length—Fan to Flywheel (In.)	Width (In.)	Height—To Top of Air Cleaner (In.)	Line Number
AI AI AI	1.73480 1.49322 1.57480 1.62520 1.28337	1 .62480 1 .62480 1 .26327 1 .49480 1 .62500 1 .15337 1 .15337	Ala Ala A.a Ala Sil Aly Aly	5.82 5.82 5.90 6.83 6.72 4.27 4.27	5.50 4.75 6.50 5.50	3 3 3 3 3 3 3	1 1 2 2 2 1 1	1.58-4.16 1.58-4.16 1.58-3.50 1.58-4.15 1.62-3.65 1.00-2.83 1.00-2.83	FFFFFFF	3435 3435 3435 3435 Sil	11.40 11.40 10.70 11.40 11.25 8.81 8.81	7.50 6.50 7.50 7.00 3.25 3.25	7 7 7 7 7 5 5	3 .35 3 .35 3 .35 3 .75 3 .62 2 .25 2 .25	C-S C-S C-S C-S C-S C-A.V.	C-S C-S C-S C-S C-S C-A.V.	0000 :00	Pi Pi Mu Mu Mu Pi Pi	1543 1543 2572 2572 2250 1600 1600	C-S C-S C-S C-S C-S C-A.V.	Ele Ele Ele Ele H-E H-E	94½° 62¼ 52½ 54¾ 54¾ 4158° 32½	335/8 411/32 28 291/2 30 253/8 21	40 <sup>3</sup> / <sub>16</sub> 50 42 <sup>39</sup> / <sub>4</sub> 49 <sup>1</sup> / <sub>2</sub> 44 <sup>†</sup> 36 <sup>1</sup> / <sub>8</sub> 33 <sup>1</sup> / <sub>2</sub>	
VI	1.75437	1.62437	Ala	6.06	5.37	4	2	1.50-3.81	F		12.81	8.06	7	3.62	C-S	C-S	C	Mu	2425	C-S	Ele	5215/16	281/8	451/16	
11	1.81451	1.62451	YA	5.86	5.67	4	2	1.75-3.84	F	2335	10.50	7.35	7	3.35	C-S	C-S	0	Mu	2200	C-S	Ele	5511/2	28.72	47.2	
		1.14389 1.06438	SAA	6.83	6.84 5.09	4	2 2	2.00-3.62 1.50-3.34	F	4037 4037	12.56 11.12	11.5 8.70	5 7	3.37	C-S C-S	C-S C-S	C	Mu	2570 2200	C.A.V.	Ele	445/16 503/16	3134 261/2	5219/ <sub>52</sub> 457/ <sub>16</sub>	1
/1	1.30383 1.93458 1.90494	1.30383 1.55458 1.80494	Ala Ala Ala	5.53 5.75 6.60	3.53 5.00 6.81	3 4 4	2 1 1	1.30-3.25 1.62-3.86 1.62-4.20	FFF	EN16S EN16S EN16S	8.80 10.50 10.50	5.48 6.36 9.85	7 7 7	2.90 3.50 3.50	C.A.V. C.A.V. C.A.V.	Ley Ley Ley	CCC	Mu Mu Mu	2350 2350 2350	C.A.V. C-S C-S	Ele Ele	41 <sup>29</sup> 64 49 <sup>7</sup> /8 52 <sup>1</sup> /4	2245/4 30.91 3039/4	38554 44.57 45.44	1
	2.12550 2.12550	2.12550 1.68550	YA YA	6.47 6.47	7.30 7.30	3	2 2	1.73	F	EN23 EN23	9.87 9.87	8.00 8.00	5 7	3.35 3.35	C.A.V. C.A.V.	C.A.V.	0	Mu Mu	2500 2500	C.A.V.	Ele Ele	39½ 50¼	27½ 27½	43½ 43¼	1
	1.40347 2.00462		YA CI YA CI YA YA	4.25 4.25 4.25 4.25 4.25 4.25 4.49 4.49	2.55 4.42 2.55 4.42 2.55 3.77 3.77	2 3 2 3 3 3 3 3	2 2 2	1.25-2.96 1.25-2.96 1.25-2.96 1.25-2.96 1.25-2.96 1.37-3.80 1.37-3.80	FFFFFF	3240 3240 3240 3240 3240 3240 3240	9.00 9.00 9.00 9.00 9.37 9.37	3.70 3.70 3.70 3.70 3.70 5.33 5.33	5 7 7 7 7	2.75 2.75 2.75 2.75 2.75 2.75 3.12 3.12	C.A.V. C.A.V. C.A.V. C.A.V. C.A.V. C.A.V.	C.A.V. C.A.V. C.A.V. C.A.V. C.A.V. C.A.V.	CCCCCCC	Mu Mu Mu Mu Mu Mu Mu	1764 1764 1764 1764 1764 1470 1470	C.A.V. C.A.V. C.A.V. C.A.V. C.A.V. C.A.V.	Ele Ele Ele Ele Ele Ele	24 <sup>3</sup> / <sub>4</sub> ‡ 34 <sup>1</sup> / <sub>2</sub> 34 <sup>1</sup> / <sub>4</sub> ‡ 42 <sup>3</sup> / <sub>4</sub> 52 <sup>1</sup> / <sub>4</sub> 50 <sup>1</sup> / <sub>2</sub> 42 <sup>3</sup> / <sub>4</sub>	23 <sup>3</sup> / <sub>4</sub> 23 <sup>1</sup> / <sub>4</sub> 23 <sup>3</sup> / <sub>4</sub> 23 <sup>1</sup> / <sub>4</sub> 24 26 24 <sup>1</sup> / <sub>4</sub>	36 3434 3934 3434 3412 3712 3814	1
	1.43393	1.25393	Ala	4.34	2.68	3		1.25-3.00	F	4130 4130	8.00 13.00	3.75	7	2.50	C.A.V.	C.A.V.	CC	Pi Mu	1600 2900	C.A.V.	Ele Ele	4178 T	22½ 23¾	38½ 43¾	

0—Open
PC—Precombustion chamber
Pi—Pintle
R—Railears
SAA—Silicon Aluminum Alloy-Anodised
Sil—Silicon "Lo-Ex"

T—Trucks
TC—Turbulence chamber
Tr—Tractors
VI—Vertically in-head
W—Wet liners
YA—Special "Y" alloy heat treated

Associated Equipment Co., Ltd.
 The Bristol Tramways & Carriage Co., Ltd.
 Coventry Diesel Engines, Ltd.
 Crossley Motors, Ltd.
 Transport Vehicles (Daimler) Ltd.

(6)—Dennis Bros., Ltd.
(7)—Leyland Motors, Ltd.
(8)—Henry Meadows, Ltd.
(9)—F. Perkins, Ltd.
(10)—John I. Thornycroft & Co., Ltd.

### Registered Civil Aircraft by **Engine Classification**

Aircraft Type	Number of Aircraft
Single Engine	80,537
I Wo Engine	3,447
Inree Engine	48
Four Engine	484
Total	84.516
Unspecified	7,441
unuers	673
Lighter-than-air	14
Total	92 644

### Three-Engine Civil Aircraft by HP Classification

Total Take-off Hp	Number of Aircraft
300-700	 21
.01-1.000	20
1,001-1,725	 7
Total	 48

### Civil Aircraft by HP Classifications

### Single-Engine Civil Aircraft by HP Classification

Total Take-off Hp	Number of Aircraft
50 & Under	4,280
50-70	35,158
71–100	17,448
101–200	11,673
201-350	7,124
351-500	3.830
501-700	958
701–1000	16
1001–1300	18
1301–1600	25
1601-2500	5
2501 and over	5 2
Total	80,537

### Two-Engine Civil Aircraft by HP Classification

Total Take-off Hp	Number of Aircraft
60-499	121
450-999	2,000
1,000-1,999	97
2,000-2,999	1,135
3,000-3,999	61
4,000 and over	33
Total	3.447

### Four-Engine Civil Aircraft by HP Classification

Total Take-off Hp	Number of Aircraft
2,400-4,999	 16
5,000-5,999	 319
6,000-8,800	 149
Total	484





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Rovin.

Talbot.

Alfa-R Cisital Fiat...

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MODEL			ENG	INE							G	ENERAL		FUE				TRAN			REAR AXLE					
	Number of Cylinders Bore and Stroke	Max. Brake Hp. at Specified R.P.M.	Piston Displacement (Cu. In.)	Compression Ratio	Cylinder Arrangement	Valva Location	Crankcase Type	Piston Material	Camshaft Drive	Wheelbase (in.)	Tread-Rear (In.)	Tires (In.)	Oil Pressure to-	Carburetor—No. Used and Type	Supercharged	Clutch Type	Location	Type No of Forward Speeds	onizing C	Final Drive	Gear Ratio (to-1)	Torque taken by	Drive on	Independent Suspension	Service Brakes	Servo Unit Fitted
	6-2.56x3.94	74 4500	101 8	6 60		_			8	RITIS		5.50/17			7				Λ							
A.C.  Aliard Four-seater Two-seater Coupe Alvis Fourteen Armstrong Siddeley Austin Dorset, Devon Sixteen Sheerline Princess	8-3 06x3 75 8-3 06x3 75 8-3 06x3 75 4-2 91x4 33 6-2 56x3 94 4-2 57x3 50 4-3 12x4 37 6-3 43x4 37	85-3800 85-3800 85-3800 65-4000 70-4200 40-4300 64-3800	221 .0 221 .0 221 .0 115 .4 121 .5 73 .2 134 .1 243 .0 243 .0	6.25 6.25 6.72 7.00 7.20 6.80 6.80	V V V	3 1 3 1 3 1 3 1 4 1 4 1 4 1		AL AL AL AL	HHICCCCCC	112 106 112 108 115 92 104 119 119	0 50 0 0 50 0 0 58 0 0 54 0 0 54 5 5 56 0 0 60 0	6.25/16 6.25/16 6.25/16 6.00/16 5.50/17 5.50/16 5.75/16 6.50/16	ab ab abce abce abce abce abce abce	1-Do 1-Do 1-Do 1-Ho 1-Do 1-Do 1-Do 1-Do 2-Do	N N N N N N N	SP SP SP SP SP SP SP SP SP	00000	Hs Hs Hs Hs Hs Hs	3 Y 4 Y 4 Y 4 Y 4 Y 4 Y	Hy SB SB Hy Hy	4 10 4 10 4 10 4 87 5 10 5 43 4 33 4 45 4 45	tt Sp Sp Sp Sp Sp Sp	R R R R R R	FNFFNFF	H H M M H H	N 218 N 218 N 218 N 196 N 188 N
Sentley   Mark VI	6-3 50x4 50 6-2 60x3 78 4-3 07x3 94 6-2 74x4 35 6-3 35x4 72 8-3 35x4 72 4-2 23x3 64 4-2 50x3 64 8-3 06x3 75 6-2 60x3 78	45-3200 70-4200 110-3600 150-3600 23 . 4-4000 30 . 1-4000 85-3500	71.5	7.30 6.20 7.00 6.30 6.30 6.30 6.16		4   3   4   5   3   3   3	1000	Als AL AL AL AL AL	Hococcccc	114 114 114 138 147 90 94 108	0 54 0 6 52 2 0 52 0 0 63 0 0 63 0 0 45 0 2 58 0	6.50/16 5.50/16 165/400 6.00/16 8.00/17 4.50/17 5.00/16 6.00/16 5.25/16	abcde abce abce abce abce abce abce abce	2-Ho 1-Do 1-Do 1-Ho 2-Do 2-Do 1-Do 1-Do 1-Do 3-Do	N N N N N N	SP SP SP H H SP SP SP SP		Hs Hs Pr Pr Pr Hs Hs	4 Y 3 Y 4 4	Wo Hy Hy SB SB SB	3 .73 3 .90 3 .4† 4 .37 4 .73 4 .09 5 .50 5 .50 4 .11 3 .55	Ta Ta Sp Sp Sp tt tt	RFRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR	FFFNNNN	H H M M M M	Y
Gordano 1½ Litre Healey 24 Litre Hillman Minx H.R.G. 12 HP 9 HP Humber Hawk Snipe Super Snipe Pullman	4-3.03x3.15 4-3.16x4.70 4-2.48x3.74 4-2.67x4.05 4-2.36x3.74 4-2.95x4.33 6-2.74x4.72 6-3.35x4.72	104 35-4100 61-4800 40-5200 56-3800 65-3500 100-3400	149.0 72.2 91.3 65.5 118.6 166.6 249.0	6.50 7.00 7.75 6.40 6.40			I Sel In L In	AL AL AL AL AL	000000000	102. 92. 103. 100. 114. 114.	0 54.0 0 48.1 5 45.0 0 56.0 0 56.0	5.00/18 7.57/15 5.00/16 4.75/17 4.75/17 5.75/16 6.00/16 06.00/16	abc abce abce abc abcde abcde	1-Do	N N N N N N N N N N N N N N N N N N N	SP SP SP SP SP SP SP SP	00000000	Hs Hs Hs Hs Hs	4 Y 4 Y 4 Y	SB SB SB SB SB	4.50 3.50 5.22 4.55 4.55 4.78 4.67 4.09 4.09	Sp Sp Sp Sp Sp Sp	RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR	FNNNFFF	H M M H H	N 14 N 18 N 19 N 13 N 12 N 20 N 24 N 25 N 29
nvicta.  laguar. 1½ Litre 2½ Litre 3½ Litre 3½ Litre P.W.M. lowett Bracford Javelin	6-3 19x3 82 4-2 87x4 17 6-2 87x4 17 6-3 23x4 33 6-3 35x3 35 2-3 50x4 00 4-2 85x3 54	65-4600 102-4600 125-4250 130-4300 19-3500	182.9 108.3 162.5 212.6 235.5 61.3 90.6	7.20 7.30 6.75 7.25 5.90	1	7 3 7 7 9 2 3	I In I In I In I In I In L Se I Se	AL AL Ash AL	CCCCCCC	102 120 120 126 90	5 55.1 0 56.1 0 56.1 0 59.1 0 48.	0 6.00/16 0 5.65/18 0 5.85/18 0 5.85/18 0 6.50/16 0 5.00/16 0 5.25/16	abcd abcd abcd abce abc	3-Ho 1-Ho 2-Ho 2-Ho 2-Ho 1-Do 2-Do	N N N N N N	SP SP SP SH SP SP	U U U U Se Se	Hs Hs Hs	4 Y 4 Y 4 Y 4 Y 3 N 4 Y	Hy Hy Wo SB	4 27 4 87 4 55 4 27 3 40 4 89 4 86	Sp Sp Sp Ta Sp	RRRR	N N F	M M M H	N 24 N 17 N 22 N 22 N 21 15 N 21
Lagonda 2.6 Litre Lanchester LD10 Lea Francis 12 HP 14 HP Lloyd	6-3.07x3.54 4-2.50x4.00 4-2.72x3.94 4-2.95x3.94 2-2.76x3.35	40-4200 55-4700 65-4700	157.5 78.5 91.3 107.8 39.9	7.00 7.25 7.25	1	3 3			C	99.	0 48. 0 52. 0 52.	0 6.00/16 0 5.25/16 0 5.50/17 0 5.50/17 0 4.00/17	abce	2-Up 1-Do 1-Ho	N N N	SP H SP SP	UUUU	Pr Hs	4 N 4 Y . Y	SB SB	4.56 5.00 5.12 4.87 5.24	Sp		F	IVI	N 20 N 13 28 28
M.G. T.C. Midget  1 ½ Litre  Vorgan 4 4  F Super 3 Wheeler  F4, 3 Wheeler  Morris 8HP-E  10HP-M	4-2.50x3.64 4-2.50x3.64 4-2.50x3.64 4-2.24x3.54	44.5-4800 40-4300 32-3500 32-3500 29.6-4400	76.3 77.3 71.5 71.5 56.0	7.20 7.00 6.20 6.20 6.50		3		AL AL AL	CCCCCCC	99 80 96 99 89	0 50. 0 45. 0 * 0 * 0 46.	4.50/19 5.25/16 4.50/17 4.00/18 4.00/18 4.50/17 5.00/16	abce abc abc abc abce	2-Do 1-Do 1-Do 1-Do 1-Do 1-Up 1-Up	N N N N N	SP SP SP SP SP SP		Hs Hs Hs Hs	4 Y 4 Y 3 N 3 N 4 Y 4 Y	SB C C SB	5.12 7.36 4.72 2.11 2.23 5.29 5.29	Fa Sp	RRR	F A A N	M M H	N 14 N 11 N 10 N 7 N 7 N 20
Riley 1½ Litre 2½ Litre Rolls-Royce Silver Wraith Rover 9HP 10HP 12HP Standard Eight Fourteen Vanguard Sunbeam Talbot Ten	4-2.74x4.17 4-2.87x4.17 4-3.15x3.62	50-4000 72-4000 35-4800 37-5000 43-4000 28-4000 44-4000 50-3750 65-4500	163.1 182.1 232.1 61.1 98.1 108.1 112.1	0 6.80 0 6.40 2 7.10 9 7.25 8 6.90 1 6.50 5 6.61 6.70 1 6.50	1	3 4 3 3 3 3 3 3 3 3 3	I In In F In F In	AL AL AL AL AL AL AL	COHOCOCCCCCC	119. 127. 110. 110. 91. 95. 103. 83. 100. 100. 94.	0 52 0 60 5 54 5 54 0 45 0 48 0 52 0 46 0 54 0 54	2 5 .75/16 6 6.00/16 6 50/17 5 .50/17 5 .50/16 5 .50/16 5 .50/16 6 4 .75/16 6 5 .50/16 6 5 .50/16 6 5 .50/16	abce abce abc abc abc abc abc abcd abcd abcd	1-Up 2-Up 1-Do 1-Do 1-Do 1-Do 1-Do 1-Do 1-Do 1-Do	N N N N N N N N N N N N N N N N N N N	SP SP SP SP SP SP SP SP SP SP SP SP SP S	מטטטטטטטטטטטטטט	Hs Hs Hs Hs Hs Hs Hs	4 Y 4 Y 4 Y 4 Y 4 Y 4 Y 4 Y 4 Y 4 Y 4 Y	SB SB SB SB SB SB SB SB SB SB SB SB SB S	4.88 4.11 3.72 4.88 4.70 5.43 5.43 4.87 5.14 4.86 4.57 4.62 5.22	Sp Sp Sp Sp Sp Sp Sp	******	FFFZZZFFF	H H H H M H M H M H M M H M M H M M H M	N 2 N 3 Y N 1 N 1 N 1 N 1 N 1 N 1 N 1 N 1 N 1
2 Litre   Roadster	4-2.87x4.17 4-2.74x3.74 6-2.42x3.94 4-2.24x3.54 4-2.50x3.54 4-2.74x4.02 6-2.42x4.02	63-4400 63-4400 35-3600 47.5-3600 39.2-4600 43.7-4200 55.4-4200	108.1 108.3 88.0 108.0 56.0 69.1 0 110.1	3 6.70 0 6.80 6 6.75 0 7.30 5 6.60 4 6.40 9 6.40		333333334	In   In   In   In   In   In   In   In	AL AL Aw Aw	CCC	100 108 97 105 89 90 98 104	0 55. 0 55. 7 49. 5 51. 0 46. 0 48. 0 50.	5 5.25/16 5 75/16 5 75/16 6 5.00/16 5 5.00/16 0 5.50/16 2 4.50/17 0 5.50/16 0 4.50/17 0 6.00/16 7 6.25/16	abcd abcd abce abce abce abce abce abce	1-Do 1-Do 1-Do 1-Do 1-Do 1-Up 1-Do 2-Do 2-Do	N N N N N N N N N N N N N N N N N N N	SP SP SP SP SP SP SP SP	000000000	Hs Hs Hs Hs	4 Y 4 Y 4 Y 4 Y 4 Y 4 Y 4 Y	SB SB SB SB	4.44 4.57 4.86 4.62 5.28 5.33 5.33 4.80	Sp Sp Sp Sp	RRRRRR	F Tf N N N		N 1 N 1 N 2 N 2 N 1 N 2 N 2 N 3 N 3
										FREN		407					167	111	0	.05			-		H	12
Citroen 11BL 11B 11B 11S Delage D6 Delahaye 134N 135M 148L 175 178	4-3.07x3.94 6-3.07x3.94 6-3.27x3.55 4-3.15x4.10 6-3.30x4.10 6-3.70x4.10 6-3.70x4.10	1 56 1 77 5 95 0 130 0 105 0 125		6.20 6.30 6.50		5 7 5 7 7 7	l in la	AL AL AL AL AL AL	CCCC	119 119 124 116 116 124 116 124	0 58 0 58 0 57 0 57 0 58 0 58 0 60 0 60	0 165/400 0 165/400 0 185/400 0 5.50/17 0 5.50/17 0 6.00/17 0 6.00/17 0 6.00/17	abc abcd abcd abcd abcd abcd abcd abcd	1 1 1 1 1 1 1		SP SP SP SP SP SP SP		E	3 3 4 4 4 4 4 4 4	SB SB SB SB SB SB SB SB		Ra Ra Sp Sp Sp Sp	FRRRRR	AAAFFFFFFF	H H M M M	

#### Foreign Passenger Cars-Concluded

		ENGINE					GENERAL			FUEL SYSTEM		TRANS- MISSION			REAR AXLE											
MAKE AND MODEL	Number of Cylinders Bore and Stroke	Max. Brake Hp. at Specified R.P.M.	Piston Displacement (Cu. In.)	Compression Ratio	Cylinder Arrangement No. of Main Bearings	Valve Location	Crankcase Type	Piston Material	Camshaft Drive	Wheelbase (In.)	Tread-Rear (In.)	Tires (In.)	Oil Pressure to-	Carburetor—No. Used and Type	Supercharged	Clutch Type	Location	Туре	No. of Forward Speeds Synchronizing Clutches	Final Drive	Gear Ratio (to-1)	Torque taken by	Drive on	Independent Suspension	Service Brakes	Servo Unit Fitted

#### FRENCH (Continued)

			1	-	1	1	1	1	1		1	1 1 1	1	1 1	1 1	1 1 1	. 1	1 1
Ford	8-2.60x3.20 4-2.83x2.63 4-3.30x3.54	*********	6.60 7.00 7.00	V		n AL	G	108.0 90.0 102.0	60.06. 58.015 51.05. 53.06. 56.06.	0/40 25/15 00/16	abce abcd abcd abcd abcd	1 SP 1 SP 1 SP 1 SP 1 SP	U	Hs Hs E Hs	3 SB 4 SB	Ra R Ra R Ra R Ra R Sp R	A H A H	11024 16534 2236
Panhard         Dyna           Peugeot         202           Renault         4N           Jura           Rovin	4-2.67x3.07 4-2.16x2.36 4-2.28x3.74	30- 19-4000 24-3500	7.00 6.70 6.50	1 3		n AL n AL	CCC	96.0 83.0 92.0	48.0 13 47.0 15 47.0 13 45.0 15 38.0 2	5/400 5/400 5/400	abc abc	2 SP 1 SP 1 SP 1 SP 1 SP	U	Hs Hs Hs Hs	4 SB 4 Wo 3 SB 3 SB 3 SB	Ta F H R Ta R H R Ta R Ta R	H	12124 1105 1234 1675 770
Salmson         S4E           Simca         Ging           Six         Huit           Talbot         2AC	4-2.04x2.63 4-2.04x2.63 4-2.67x2.95	16	6.00 6.00 6.00	1 2	1	n AL n AL n AL n AL	. C	78.0 78.0 95.0		00/15	abc abc abc	1 SP 1 SP 1 SP 1 SP 2 SP	U	E 	4 SB 4 SB	tt R Sp R Sp R Sp R Sp R	F H H F H F	1918 661 727 950 2590

In addition to the above the following prototypes have been made, but cars are not in production:—Bernardet 4-2.51x2.44; Boitel 2 cyl.; Bugatti 4 cyl.; Dolo 4-2.28x2.12 and 8-2.28x2.12; Gregoite 4-3.38x3.38; Julian 1-3.07x2.59 and the Rosengart 8-3.18x3.75.

Alfa-Romeo	6-2.83x3.94	105	149.0	7.50 1	1	In	AL	C	108.3 57.9 6.00/18  abd						H  R	A	H	IN	2370
	6-2.83x3.94	90	149.0	7.00 1	1	In	AL	C	118.1 57.9 6.00/18 abd					4 Y SB		A	H	N	2370
Cisitalia202	4-2.68x2.95	50-5500	66.5	7.50 1	1	In	AL	HI	94.5 49.1 3.50/15 abd						4.10 R				
Fiat	4-2.68x2.95	32-4000	66.5	6.00 1	3	Film	AL	C	95.3 48.3 3.00/15 abd										
500	4-2.05x2.64	13-4000	34.8	6.50 1	2 1	F In	AL	C	78.7 42.6 2.50/15 abd						4.87 Ta R				
	6-2.56x2.95								110.2 52.9 3.25/15 abd										
lancia Ancilia	4-2 94x3 35	48-4300	90 6	5 75	3	In	AL	C	108 3 50 7 165 /400 abd	1-Un	N	SP	Se Hs	4 N C	4.10 Ta R	A	H	N	2922♥

In addition to the above the Ferrari and Maserati companies have produced a few racing cars. The Ninfea company have only produced a few cars.

#### RUSSIAN

ı	Kim 4-pass. 10	4-2.50x3.64	26-3800	71.5	5.75	L 1.	.IAL	Level	94.0	45.0 5	50/15	1	1-Do	SP	1	3 SB	5.50	1		. M I	N  1	8484
ı		4-3.87x4.25					AL	11	12.0	56.07	.00/16		(g)	SP		3 SB	4.40			. 199 1	N 2	2860₺
	Gaz5-pass, M20	4-3.23x4.33	50-3600	142.0	6.20	L	AL	1	06.0	53.76	.00/16					3 SB						
ı	Zis7-pass. 101	8-3.34x5.00	90-2800	350.0	4.80	1	CI	1	41.5	61.07	.50/17					3				. M	1 5	6764
В.	Zis 7-nass 110	8 3 54v4 64	140_3600	366 0	6 75	1	Al	1	48 0	7	50 /16	1	1-Dd	SP		3 Hv	4 36		1	THE P	AI I	

The above specifications of Russian cars are for basic models only.

:-Mechanical Brakes with Vacuum booster booster

-Car Weight

-Band shift standard, preselective optional

-Hydraulic and Mechanical brakes

-Curb weight

-Front tread, rear only 1 wheel

-Main bearings

-All four wheels

AL-Aluminum Alloy

Als-Aluminum Alloy with steel struts

Ash-Aluminum Alloy with steel skirt

Aw-Aluminum Alloy, wire wound

(Lb.) Weight

Chassis

1456 1174 1000

1442

1736 1882 1895 2100\*\* 2490\*\* 1904& 2228& 2800& 3024& 3108&

2281& 2425& 2794& 2061 1719

ES

Ca—Completely automatic, turbo-transmitter
CI—Cast Iron
d—Piston Pins
DD—Double Dise
Dd—Dual Downdraft
Do—Downdraft
e—Chain or Timing gears
E—Electric shift
(f)—Final Drive Unit mounted on frame
F—Front wheels
F—Valves in Head and Side (F-Head)
Fa—Rear wheel fork arms

G—Spur gear
(g)—M1 with Economizer
H—Hydraulic (brakes)
HI—Helical gears
Ho—Horizontal
Hs—Hand shift
Hy—Hypoid
I—In line (cylinders)
I—In head (valves)
II—Integral with cylinders
L—At side (L-Head)
M—Mechanical brakes
N—No or None
O—Horizontally Opposed (cylinders)
Pr—Preselective
R—Rear Wheels
Ra—Radius Arms

SB—Spiral Bevel
Se—Separate
SH—Single plate with hydraulic actuation
Sp—Springs
SP—Single plate, Dry
T—Independent Suspension on Front,
Torsion bar on rear
Ta—Torque arm
tt—Torque Tube
Tf—Torsion bar on front, conventional
on rear
U—Unit with engine
Up—Updraft
V—"Vee" type
Wo—Worm drive
Y—Yes

#### Shipments of Motor Vehicles by Types of Transportation

#### From Factories and Assembly Plants in United States, including Exports

Year	Railroad Carloads of Machines	Machines Delivered Overland	Machines Shipped by Boat		Railroad Carloads f Machines	Machines Delivered Overland	Machines Shipped by Boat
1929 1932	130.820	1,958,738 706,977	199,576 51,103	1937		2,452,300 1,330,334	340,773 151,632
1933 1934	198.827	930,303 1,209,291	126,258 154,540	1939		1,996,629 2,618,484	208,549 274,431
1935 1936	401.547	1,899,974 2,237,432	272,458 311,436	1941	448,043	2,756,974 1,661,637	287,703 169,664

# Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 188

# J-46—New Transporter Industrial Trucks

Introducing a new foot lift and continuing the policy of offering buyers a choice of either electric or foot lift, Automatic Transportation Co., 149 W. 87th St., Chicago 20, offers its new 1948 Transporter models for the automotive and aviation industry.

The Automatic dual lift, the new foot pump, reduces the foot pressure necessary to lift loads into moving position or maximum height and thereby eases and accelerates operation of this model. It features a hydraulic lift pump development which combines a low pressure (high speed) cylinder for raising the platform or forks into contact with skid or pallet and a high pressure (low speed) cylinder for raising the load.

Release of pressure on the pedal of the new pump opens the valve that permits the high speed cylinder to idle while the high pressure cylinder is lifting the load, whereas formerly extra foot pressure was required to do this.

The Atco electric lift, which can operate on the standard 11-plate battery of a motorized hand truck, thereby

eliminating the necessity of over-size batteries, will be featured on all allelectric models.

No lift and move, even with maximum load and to maximum height, with an Atco electric lift transporter, requires more than five seconds.

A new, enlarged bumper guard is a new feature of both Automatic dual lift and Atco electric lift 1948 Transporters. Of ½ in. by 6 in. formed steel plate, the new guard is fitted over the former smaller bumper plate, which becomes a structural support in the new models. The enlarged guard is easily removable, if removal is desired by the user.

"Dead-man control" is another feature of both foot-lift and electric-lift Transporters with their double-position brake. It is applied either by raising or lowering the guide handle, thus making effective braking action simple under any operating conditions and providing steering and braking leverage simultaneously for operations on ramps.

Both the foot-lift and electric-lift Transporters are made in Automatic's four standard units, the 4000- and 6000lb load capacity platform models and

#### J-48-Carbon Arc Torch

The Lincoln Electric Co., Cleveland 1, Ohio, announces a new low price carbon arc torch for use with a-c welding machines. The torch is said to be of

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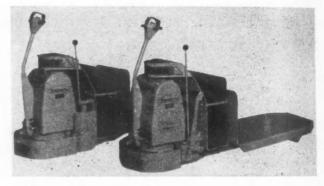
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Lincoln carbon arc torch.

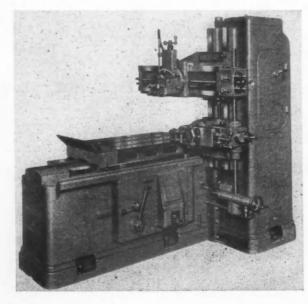
rugged yet lightweight construction, designed to extend the use of welding equipment to jobs where the application of heat is desired without melting the metal being worked on.

Transporter with Automatic dual lift and Transporter with Atco electric lift.



the 3000- and 4000-lb capacity pallet models, and in a variety of special models.

#### J-47—Improved Openside Planer



Rockford Machine Tool
Co., Rockford, Ill., has redesigned this 36-in. openside shaper to provide two
new advantages. Range of
application is greater due
to the new heavier column
and rail, and the new redesigned side head. Ease
of set-up and operation is
improved because of such
teatures as dual controls
for table operation from
either side of table.

As extra equipment, power rail elevation is available to further simplify set-up work. Safety devices incorporated in the stop and start lever assemblies prevent accidental starting of the table.

With the arc torch a high temperature flame is produced between two copper coated carbon electrodes clamped in aluminum alloy jaws. Both carbons are readily adjustable, geared to move together so that the angle of the carbons can be kept constant at all times. The handle of the torch is provided with thumb control tabs geared so that a slight movement of the thumb adjusts the distance between the carbons. operate, the carbons are brought together to produce the arc, then the proper flame is automatically obtained by reversing one of the thumb tabs until the gears lock.

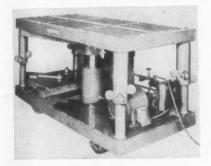
The carbon holder jabs will hold either a 5/16 in. or 3% in. diameter carbon without adapters or special extra jaws. The torch is equipped with two cable leads. One lead has a tip that is clamped to the welder's regular electrode holder, and the other lead has a spring clip that clips to the welder's ground lead. The handle is made of plastic. With an a-c welder the arc torch can be used for all types of brazing and soldering work, general heating, as well as hard surfacing of thin materials. The torch is suitable

for both production and maintenance work; for soldering light or heavy copper, tinned or galvanized parts; for preheating small work areas prior to welding; heating and straightening bent work; brazing cast iron, monel metal, aluminum sheet and castings; for fusing the powder type of hard surfacing material to thin metals; and for such odd jobs as applying heat to loosen rusted nuts.

#### J-49-Large Size Hydraulic Liftable

A 24,000-lb capacity electric hydraulic Liftable for handling dies has just been introduced by Service Caster & Truck Corp., Somerville, Mass.

With rollers to discharge the load from either side, the 36 in. by 72 in. die table has a raised height of 40 in. Lowered height is 30 in. The hydraulic system is activated by a 11/2 hp motor and the table top is raised with a push button control while a hand valve con-



Liftable for handling dies up to 12 tons

trols the lowering. The eight-wheel running gear of the Service Liftable includes four rigid casters and four eight in. diameter wheels on a "fifthwheel" unit.

#### J-50—Heavy-Duty Pedestal Comparator

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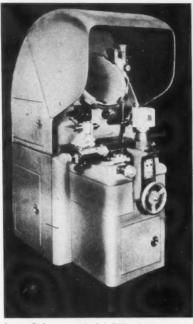
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of

A heavy-duty pedestal comparator with a 14-in. diameter screen and a power-elevated table, the Model PET-14, has just been brought out by Jones & Lamson Machine Co., Springfield, Vt. This model is specifically designed to assure utmost stability when measuring heavy objects.

The hardened and ground table is 30 in, long and operates on balls in hardened "V" inserts in the bed. The table assembly is supported on an "A" frame construction fastened to a four-in. diameter hardened column which is supported and guided in two preloaded reciprocating ball bearings. Each bearing contains 126 balls. The column is adjusted vertically, by means of a 10-pitch elevating screw, either power or hand operated.

Vertical measurements are made by means of a sliding head, equipped with a 0.0001-in. indicator attached to the slide support and a 0.0001-in. micrometer attached to the table support. An anvil rod engages the micrometer anvil,



Jones & Lamson Model PET-14 comparator.

end measuring bars or gage blocks, as the case may be. Measurements up to one in. can be made with the micrometer. Gage blocks or end measuring bars are used for measurements over one in. up to four in.

The table can be compounded 20 deg either side of center, for inspecting objects with helices. It has four-in, lateral travel, and measurements up to four in. can be made by means of the 0.0001-in, micrometer, end measuring bars or gage blocks. The table anvil is air-cushioned to prevent shock when contacting the micrometer anvil.

Objects up to 8 in. diameter and 20 in. long between centers can be inspected at magnifications ranging from 10 to 100.

#### NEW

Production and Plant

#### EQUIPMENT

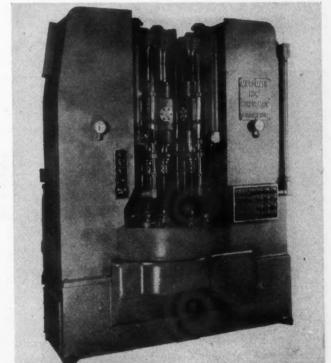
For additional information regarding any of these items, please use coupon on page 188

#### J-51—Heavy Duty Hydrohoners

The Micromatic Hone Corp., Detroit 2. Mich., now has available a new line of Microhoning machines. These machines are heavy duty, multiple spindle, unit constructed Hydrohoners.

Microhoning is basically a stock removing process. As the stock is removed the geometry (straightness and roundness), size and finish may be held to close tolerances. When the hardness of the material and the stock removal increase, the power requirements also go up. As the allowed tolerances are reduced the adjustments and controls must be correspondingly finer.

The multiple spindle, unit constructed, quill-type machines give this added power and control. The spindles are mounted in quills and each quill is actuated as an independent unit. This type of design is used to reduce the weight reciprocated to a minimum and eliminates the necessity of guide bars. (Turn to page 182, please)



Hydrohoner machine arranged to microhone the cone bore of bearing races.

# NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 188

(Continued from page 181)

The torque and thrust are taken along the center line of the spindle.

The expansion of the tools and the reciprocation of the quills are powered and controlled hydraulically. The feed-out is positive and the pressure applied in each tool may be adjusted independently.

Each quill is mounted on a separate column. The columns are spaced about a common base and indexing table. By interlocking the hydraulic control panels, the automatic indexing table and the automatic sizing devices the operation is made entirely automatic.

The Hydrohoner machine shown is fixtured to Microhone the cone bore of bearing races. Ten races are stacked in a shuttle. They have a hardness of 60-62 Rockwell "C." The stock removal in the stacked races may vary from .008 in. to .012 in. on the diameter. They are Microhoned in three progressive steps. This not only makes the operation very productive but also makes it possible to vary the abrasives, feed and speeds to match the condition of the bore as the operation progresses. The first spindle removes the out-of-

roundness and makes all the races the same size. A hard stick is required to withstand the severe dressing action encountered in this station. The second spindle removes additional stock. A softer more free cutting abrasive is used to remove stock rapidly and without heat. The last spindle generates final size and finish. The abrasive and pressure depends on finish desired.

# J-53—Induction Heater to Reheat Forgings

Ajax Electrothermic Corp., Trenton 5, N. J., has designed an induction heater to eliminate waste caused by attempting to forge bars that have cooled too much during preliminary operations. This new Ajax-Northrup induction heater reheats the piece the

self-contained, and is controlled by a foot switch. Bars four in. square and up to a yard long are heated to the forging temperature in an ordinary fuel fired furnace and then are removed for a tong hold forging operation. During this operation, they drop to 2000-2100 F. and by previous forging methods have been too cold for good forging results. Now the cooled bars are fed onto rollers to the high frequency induction furnace where they are reheated on an automatically timed heating cycle to emerge at the exact forging temperature desired.

The unit illustrated above is sized for four-in. bars, and has twin heating coils, each of which draws 125 kw of 960 cycle power. Power source is a 700 kw, 960 cycle, 400 volt motor-generator unit. One motor-generator sup-



Ajax-Northrup induction heater

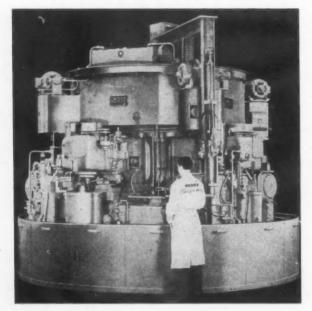
few hundred degrees required to bring it back to the proper forging temperature. Located at the forging machine, it turns out one bar every 60 seconds, timed right to the forging operation.

The new high-frequency heater is

plies power for two twin heaters, or four work stations.

This type of work station can be designed to exactly fit practically any size job. Heating coils are interchanged when switching from one job to another. The capacitors are located in the bottom of this self-contained cubicle, while the timers, contactors, etc., are in the overhead section.

#### J-52—Four-Station, Continuous Cycle Machine



This four-station, continuous cycle machine has been developed by the Cross Co., Detroit 7, Mich., to produce oil well tool joints. The machine sets the pace for the operator who merely unloads, loads, and presses a button. Power rapid traverse then automatically positions the work with the cutter. The entire machine rotates, the stations coming to the operator one at a time as the parts are completed. Four pieces of work are finished with each revolution of the machine. Servo-controlled hoist lifts the parts in and out of the hydraulically oper-ated chucks. Rough and finish cuts are taken at the same chucking to provide uniform stock for finishing. Infeed, outfeed, and taper are cam controlled.

#### J-54—Arch Press of Improved Design

A new 28-ton capacity arch press, the No. 28A, has recently been added to the line of punch presses manufactured by Walsh Press & Die Co., Division of American Gage & Machine Co., 4907 W. Kinzie St., Chicago, Ill.

This new press was developed to meet well-defined needs in the die-casting industry, as well as in sheet metal fabrication. It is said to be especially efficient for die-casting trimming, forging trimming, plastic and rubber trimming operations and the fabrication of sheet metal.

The bolster area is 23 in. by 24 in., and the bed opening is 19 in. wide by 15 in. from front to back. Distance between uprights is 24 in., and the distance between press bed and gibs is 19

Mar



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Farsighted management relies on this modern skid-resistant flooring to protect workers from dangerous accidents caused by the number one industrial hazard . . . slipping. It knows, through experience, how Inland 4-Way Floor Plate increases profits by reducing lost man-hours and subsequent damage suits.

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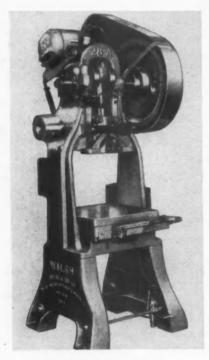
Use inland 4-WAY FLOOR PLATE

# Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 188

in. As a result of various engineering features of this machine, it is available as a flywheel, back geared, or a flywheel press with a gearhead motor.

Features, such as hard bronze bear-



Walsh No. 28A arch press.

ings, precision ground crankshaft of high tensile strength, precision scraped bearings on crankshaft throughout, as well as on gib bearings, are embodied in the design of this press.

# J-55—Automatic Hydraulic Feed Lathe

An automatic hydraulic feed lathe of heavy and rigid construction has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich. The machine is designed so that a center drive unit and an overhead facing slide can be added at any time. Hydraulic feeds and wide adjustments on all slides permit a considerable range of parts to be machined with changeover time held to a minimum.

As shown in the illustration, the machine is tooled for turning and facing

automotive rear axle shafts and in one operation finishes all diameters and faces to size, except for grinding stock on the bearing and oil seal diameters. Output is 75 to 80 pieces an hour at 80 per cent efficiency.

The machine is equipped with two turning carriages, two facing slides and a hydraulically-operated, quilltype tailstock. All feeds are hydraulic and are adjustable by dials for each attachment. Spindle speeds are controlled by pick-off gears.

All drive shafts and spindle are mounted on pre-loaded, taper-roller bearings, and all head gears are made of heat treated alloy steel with helical shaved teeth. Slides are extremely long and are mounted on hardened and ground dovetail ways. All moving parts are automatically lubricated.

Hydraulic pumps and motors are mounted on a plate on the rear of the machine, open for quick inspection and maintenance. Quick chip disposal is provided.

The machine, as equipped, weighs nine and a half tons and occupies 68 in. by 110 in. floor space.

# J-56—Vertical Oven Conveyor

To meet the lack of floor space in many plants, Ace Conveyor Industries, Inc., Detroit, have designed a new type of conveyor system known as a vertical-tower oven conveyor system. It provides a tower containing a Burdett equipped gas-fired oven, through which the conveyor runs, and carries work which has been painted, to be baked or dried. The tower can extend through the roof of the plant, if necessary, and the conveyor is adaptable to meet the requirements of the particular plant.

In a recent installation in a plant engaged in the manufacture of straight structural steel pieces this conveyor system is used to dry the rust-proofing coat of red-oxide paint in which the steel is dipped prior to entering the conveyor system. The work is carried from the dipping operation on a roller



Ace vertical-tower oven conveyor

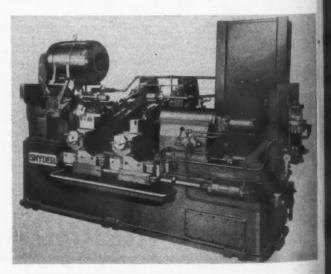
conveyor and is kicked off automatically onto an entry conveyor. The entry conveyor is timed with the verticaltower-oven conveyor so that, as the pieces of structural steel move forward on the entry conveyor they are picked up automatically by the extended pins on the vertical-tower-oven conveyor chain. The pieces are then carried up one side of the tower, through the baking cycle, turned over at the top, and carried down the other side. The oven is an integral part of the tower. The tower is constructed to give the required paint baking cycle. Extended pins on the nine strands of the conveyor chain handle the work through all operations in the tower. This is a new use for extended pins which is claimed to have proved very satisfac-

#### J-57—Hot Material Conveyor Belt

A hot material conveyor belt using glass fabric instead of the cotton fabric used in conventional belts made for this service is a recent development of the B. F. Goodrich Co., Akron, Ohio.

The company suggests for this use two weights, a four-ply for light service and a five-ply for wider, longer belts where working stresses will be somewhat higher than in the light service.











more power through better piston rings. Many varia-

tions on that theme have been developed with the help of leading engine builders. Their continued preference has made Sealed Power outstanding leader in the field. Today Sealed Power plants, laboratory facilities and staff are at an all time high peak of excellence. You are invited to use the full resources of Sealed Power to help make your good engines better.

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SEALED POWER PISTON RINGS PISTONS . CYLINDER SLEEVES



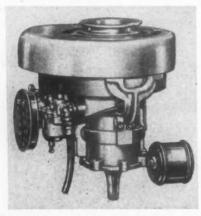
For additional information regarding any of these items, please use coupon on page 188

#### K-46—Speed Control Valve

The latest addition to the Nopak line of air and hydraulic valves and cylinders made by the Galland-Henning Manufacturing Co., Milwaukee 7, Wis., is the new Flo-Trol De Luxe speed control valve. In addition to its compact design, this valve has many other features to recommend it, according to the manufacturer. It was developed to give machinery builders and users a dependable speed control valve that is quickly, easily, and accurately ad-Furthermore, it requires no tools for adjustment, as the adjusting sleeve is readily turned and set by hand

This Flo-Trol Valve also permits a wide range of adjustment. Stability of adjustment is another advantage resulting from the fact that this valve has an unusually large seating area. Being built almost entirely of brass, the Flo-Trol is virtually rust-and-corrosion proof. Oil, water and hydraulic fluids do not affect it. Its simple de-

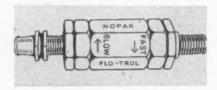
#### K-47—Mono-Cycle Engine



This lightweight Sensation Mono-cycle engine, a product of Sensation Engine Co., Omaha, Neb., weighs 18 lb and develops two to three hp. According to the manufacturer, it embodies fewer parts than any other gasoline engine. Needle bearings are used on the steel connecting rod, and ball bearings on the counterweighted crankshaft. The engine will operate in a horizontal or vertical position, or at any angle between horizontal and vertical.

sign, solid construction and the absence of seal-packings are said to make it leak-proof, wear-proof and definitely maintenance-free.

The Nopak Flo-Trol can be inserted at practically any point in an air or



Nopak Flo-Trol DeLuxe speed control valve

hydraulic line. Its small size and compact, "in-line" design result in effective, convenient installation wherever space is limited. It may be removed or replaced at any time without disturbing the piping.

# K-48—Phenolic Molding Powders

The General Electric Chemical Department, Pittsfield, Mass., will start immediately to market a complete line of phenolic molding powders. The new G-E line includes general purpose, high heat resistant, and impact resistant plastic materials.

According to the manufacturer, the molding materials provide excellent finishes and high glosses and are available in a flow range of soft, mediumsoft, medium-hard, and hard. Applications range from distributor caps and switch bases to radio cabinets and cooker handles.

Another new product of the General Electric Chemical Department is an adhesive expressly designed for bonding silicone rubber to itself and to glass, metals, and ceramics.

Known as G-E adhesive No. 12509, the new type bonding agent, possessing properties similar to silicone rubber, remains flexible and resilient over temperatures ranging from —70 F to 520 F and withstands continuous temperatures of 300 to 350 F in a dry air circulating oven. It can also be used to bond glass to glass, glass to metals, and metals to metals.

#### K-49—Hard-Surfacing Electrodes

A new group of hard-surfacing electrodes is introduced by Harnischfeger Corp., Milwaukee, Wis. Named "Hartop," there are four electrodes in this new P&H series; Brown, Green, Red and Yellow. They cover the Rockwell C range of from 35 to 63 (as deposited).

Hartop Brown provides a 35 to 40 Rockwell C hardness and is for welds subject to angular shock and abrasion. Deposits won't chip or spall along edge from glancing blows or sudden loading.

Hartop Green is designed for high resistance to impact and abrasion. It provides strong bonds on carbon and

alloy steels, manganese steels, and cast iron. Rockwell C hardness is 45 to 50,

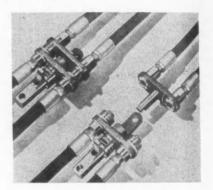
P&H Hartop Red is for severe impact and abrasion and is said to have excellent wearing qualities with high resistance to shattering impact.

The fourth P&H electrode of this new hard-surfacing group is Hartop Yellow with a Rockwell C hardness of 58 to 63. Its deposits resist abrasion and deformation caused by weight and impact.

# K-50—Breakaway Hydraulic Coupling

A new "breakaway" coupling which makes practical the hydraulic operation of farm implements, is announced by Aeroquip Corp., Jackson, Mich. Installed in the hydraulic lines between tractor and implement, the "breakaway" coupling instantly and automatically disconnects without the use of mechanical attachments, whenever the implement becomes unhitched from the tractor, according to the manufacturer.

The Aeroquip "breakaway" coupling is a twin unit connecting both pressure and return lines, using two self-sealing couplings mounted in a frame and held in coupled position by a mechanical



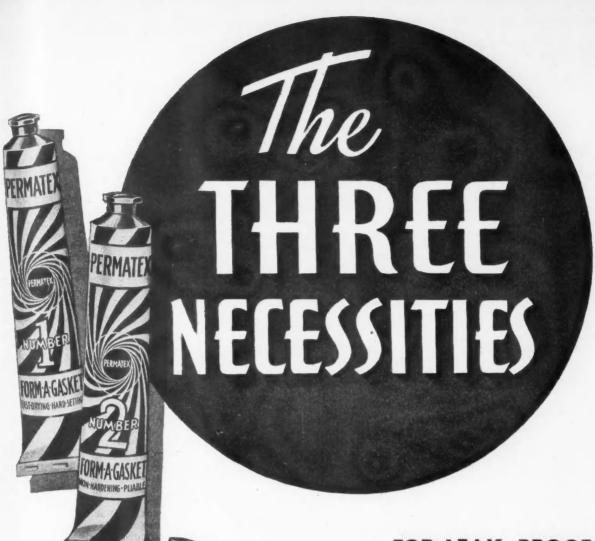
Aeroquip "breakaway" coupling

latch that automatically trips when an external tug is applied to the connecting hydraulic lines. The coupling also disconnects by tripping a trigger even when the lines are under pressure. The automatic latching mechanism needs no special tools or wrenches. Flush valve faces permit easy cleaning. No air enters the system and no fluid is lost when the "breakaway" coupling is connected or disconnected. Pressure drop through the coupling is said to be negligible.

#### K-51—Hydraulic Ratio Changer

The Wagner hydraulic ratio changer, manufactured and distributed by the Automotive Division of Wagner Electric Corp., St. Louis, Mo., is designed to reduce braking pressure on front wheels only. This is said to enable increased braking and steering ability with less possibility of dangerous swerving and skidding. It is connected

AUTOMOTIVE INDUSTRIES



# PRESSURE-TIGHT UNIONS

FORM - A - GASKET No. 1 (a paste) sets fast but not too fast for use on large surfaces. It dries hard but does not become brittle. It's a swell product for making pressure-tight, leak-proof unions . . . even when the surfaces are warped.

FORM-A-GASKET No. 2 (a paste) sets slower than No. 1. It dries to a tough, pliable layer with plenty of "cushion." It resists high pressures, continual vibrations and disassembles very easily.

AVIATION FORM - A - GASKET No. 3 (a brushable, self - leveling liquid) sets into position and dries to a tacky paste. It will not run, even when heated to 400° F. . . . nor will it become hard or brittle down to 70° F. below. Especially useful on threaded pipe and rubber hose connections. Prevents corrosion and cylinder head seizure.

ALL TYPES OF FORM-A-GASKET PRESERVE ALL TYPES OF GASKETS!

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#### PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

#### H-48—Metallizing Guns

Metallizing Engineering Co., Inc.—Metco Type L, light duty low air metallizing gun is described and illustrated in Bulletin 55. Construction details, various features incorporated in the gun, together with installation data, are included. Bulletin 50-A describes the all-purpose metallizing gun, gives installation data, etc. Two interesting articles are listed in the Metco (Jan.) News—one on machine element metallizing and another on Sprabond.

# H-49—SuperKool Base Oil

D. A. Stuart Oil Co., Ltd.—A new eight-page booklet describes Super-Kool Base Oil for deep, heavy-duty drawing operations with stainless steel, copper, etc. The booklet, a handy pocket-size type, gives advantages of the oil, applications, etc.

# H-50—Stainless Steel Tubing

The Carpenter Steel Co., Alloy Tube Div.—Detailed engineering information on the selection, fabrication and use of stainless steel tubing and pipe is given in a new data book. Subjects covered in the various chapters are selection and specification of stainless tubing, corrosion resistance, heat resistance and heat transfer characteristics, fabrication data, etc. Information on the tolerances, sizes and shapes of stainless tubing and pipe made by the company is included

#### H-51—Truck Engines

Hall-Scott Motor Div., ACF-Brill Motors Co.—The Series 400 engine is fully described and pictured in a new catalog recently made available. The text includes condensed specifications, descriptions of many illustrated applications, etc. Several pages are devoted exclusively to engine views and drawings, and dimensional charts for both the butane and gasoline engines.

#### H-52-Electric Trucks

Yale & Towne Mfg. Co.—Worksaver electric trucks are the subject of a new 3-color, 30-page bulletin. It describes and illustrates in detail the operating mechanisms which are basic to all the different Worksaver

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or

types. Recommended uses, capacity, weight, battery characteristics, speeds, dimensions, electrical characteristics etc., are given. Application photographs are included, together with descriptions of the various types of rectifiers, motor generator chargers, etc.

#### H-53 — Gas Welding Rods

American Chain & Cable Co., Inc., Page Steel & Wire Div.—A 24-page color catalog devoted exclusively to gas welding wire and its uses has been made available. It contains an easy-to-find index and covers the complete Page line; gives application, procedure, proper torch adjustment, physical properties, etc., of each gas welding rod. The back cover contains a convenient reference chart. Application photographs are shown throughout the booklet.

#### H-54-Drilling Machines

Sibley Machine & Foundry Corp.—Catalog 67, an attractive two-color booklet, describes and illustrates the Model C-20 Drilling Machine. It lists features of construction and design, operator efficiency and adaptability to general purpose work in tool room and plants. The new spindle drive assembly is diagrammed to illustrate its power and smoothness of operation. Also illustrated is the arrangement of controls for increased output and reduction of operator fatigue. Geared tapping head with electrical reversing is also described.

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(Turn to page 190, please)

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# The NEW ROTOCAP



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keeps valve faces CLEAN!

THE IMPROVED, postwar Thompson ROTOCAP assures positive rotation of a valve at all engine speeds. Replacing the conventional valve spring retainer, it eliminates blow-by, valve sticking, warping, burning and pitting.

The constant wiping action of the turning valve keeps the valve face and block seat free of carbon and other deposits, assuring a lasting seal and efficient cooling. Wear and heat are equally distributed on the entire circumference of the valve and block seat.

The same rotating action keeps the valve stem clean and prevents sticking in the guide.

Our own tests and those of a large truck builder who has adopted the ROTOCAP prove that it lengthens average valve life two to five times. Other manufacturers are now testing the ROTOCAP in their plants and on the road.

We will be glad to hear from any car, truck or engine builder who wants to know more about the ROTOCAP. The ROTOCAP is supplied completely assembled and attaches to the valve tip with conventional split type valve retainers. Below is shown a ROTOCAP disassembled.





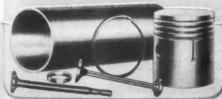
Belleville washer.



Retainer cap with six balls and springs.



Thompson improvements in precision parts engineering include Steel-Belted Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts. Sodium-Cooled Valves, Valve Rohocaps.



For further information, write—





**Products** 

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#### PUBLICATIONS AVAILABLE

(Continued from page 188)

# H-55—Special Handling Devise

Clark Equipment Co., Tructractor, Div.—A new and colorful 40-page catalog presents the company's full line of machines and special handling equipment. Featured items are the Pul-Pac, the Hi-Lo Stack, etc.

#### H-56—Die-Less Duplicating

O'Neil-Irwin Mfg. Co.—A new 40page Di-Acro Catalog contains illustrations and specifications of all Di-Acro Precision Machines which are available.

# H-57—Carbide Tool Grinders

Hammond Machinery Builders — A new 12-page catalog describes and illustrates the company's line of wet and dry carbide tool grinders, chip breaker tool grinders and diamond finishing tool grinders. A list of all new and improved carbide tool grinders, together with specifications for each machine, is included. The catalog title is Carbide Tool Grinder Catalog No. 220.

#### H-58—Cyclic Annealing

Ajax Electric Co.—Bulletin 121 describes and illustrates the cyclic annealing of forgings, wire, rod, stampings and castings in the Ajax electric salt bath furnaces. Advantages of the process, together with equipment descriptions are included.

#### H-59—Isothermal Heat Treatment

Ajax Electric Co.—Bulletin 120 describes the company's Isothermal Quench Furnaces. Several applications are illustrated; ordering information and specifications are included.

# H-60—Moisture Measuring Equipment

American Instrument Co., Inc.—A new 28-page bulletin describes the complete line of electric hygrometer equipment suitable for industrial and laboratory applications. The booklet is well illustrated.

# H-61 — Executives and the Taft-Hartley Act

The Budd Co.—The implications for executives in the 1947 Labor-Management Relations Act are set forth in a booklet written by John R. Bangs

and James W. Townsend, Industrial Relations Director and Personnel Manager of the company. The responsibility resting on management in making the law work not only is indicated but clarified and emphasized.

#### H-62—Disc Type Valves

R-S Products Corp. — A 52-page catalog profusely illustrated, with easy-to-use index, gives information on the R-S butterfly, or disc type valves. The tables are keyed to the valve drawings to show dimensions in all sizes from 2 inches to 48 inches. Half-tone illustrations are specially prepared to show important engineering details.

# H-63—How to Select a Press

Verson Allsteel Press Co. - A new 20-page bulletin No. G-47, tells how to select a press for specific job requirements and what methods of power application are most efficient. Single, double and triple action mechanicals and hydraulics, forging presses, high-speed high production models and fully automatic transfer feed presses are covered. A section gives useful information on desirable features press users should look for; a section describes and compares metal characteristics for frame construction. Charts and formulae are shown for computing pressure requirements for blanking, drawing, etc. A ready reference table to determine slide velocities at various stroke positions is included.

#### H-64—Drilling Machines

Cleereman Machine Tool Co.—A new 4-page catalog describes and illustrates the company's Model 325 Single Unit Sliding Head Drilling Machine. Complete information, details, specifications and standard accessories of this latest addition to its line of drilling machines are included.

# H-65—Resistance Welding Equipment

P. R. Mallory & Co., Inc.—A new color catalog is available which desscribes the Mallory line of resistance welding tips, holders and alloys. It is illustrated with diagrammatic and specification chart material. A section describes the physical and mechanical properties of the eight Mallory special electrode alloys and the Elkonite line, along with their specific applications in resistance welding. A chart shows the recommended electrode materials for spot welding similar and dissimilar metals.

# H-66—Mold Bases and Mold Parts

Detroit Mold Engineering Co.-A new, comprehensive catalog of DME standard mold bases, parts and products designed for the pastics and die casting industries, consist of 152pages with illustrations, drawings, specifications, prices and factual information on the complete line. The new super model mold base is described, together with details of the DME's new No. 2 steel available for mold bases and mold parts. A complete 32-page section covers listing, illustrating and describing the line of standardized parts for mold bases. mold parts, tools and accessories.

#### H-67—Centerless Thread Grinder

Landis Tool Co. — A new 4-page bulletin illustrates and describes their Centerless Thread Grinder. Illustrations show the many features of the machine. Condensed specifications and outline dimensions are also included.

#### H-68 — Portable Crankshaft Grinder

Vickers, Inc., Waterbury Tool Div.—An attractive color folder describes in detail the company's new portable crankshaft grinder. Illustrations of the grinder are given, together with a list of features and price of the grinder.

# H-69—Midget Size Hydraulic Unit

Hydraulic Press Mfg. Co., Hydro-Power Div. — A new bulletin gives information on a midget size hydraulic power unit. It describes in detail a number of typical applications of the unit and gives complete performance data.

# H-70—Flexible Couplings

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Chain Belt Co., Baldwin-Duckworth Div. — A new catalog on Baldwin-Rex Roller Chain Flexible Couplings presents a comprehensive story of the couplings, their design, applications, selection and prices. To illustrate design and application features, cutaway photographs and simple drawings are used. Diagrams of five types of shaft misalignment are shown and a group of charts simplify the selection and ordering of the couplings.

#### H-71-Shock Absorbers

The Gabriel Co. — A 4-page illustrated question-and-answer folder, entitled It's Easy to Sell Shock Absorbers, is available. The folder answers frequently asked questions on design, construction and performance of airplane type shock absorbers.

# THAT LOWER COSTS



# LPOSS Hydraulic LIFT TRUCK

Model 15-HT · Capacity 71/2 Tons



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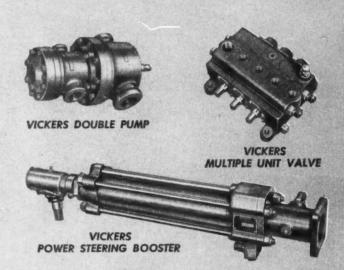
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The Ross Model 15-HT Lift Truck shown above is an excellent example of how Vickers Hydraulic Equipment can be used to help reduce materials handling costs. The cylinder that elevates the 7½ ton load at 35 ft per min gets its power from the Vickers Balanced Vane Type Pump . . . as does the tilt unit cylinder. Single lever and simultaneous control is provided by a Vickers Multiple Unit Double-Acting Valve . . . the valve spool construction assures finger tip control regardless of operating pressure; positioning is accurate, quick and easy. An integral relief valve automatically protects the hydraulic system against damage by overload.

This Ross Lift Truck has greater close quarter maneuver-

ability because it is equipped with Vickers Hydraulic Power Steering. Effortless steering is a certainty as the power required for steering is provided by the Vickers Balanced Vane Type Pump. Adequate power is instantaneously available to meet any requirement. Safety in steering is assured as no reaction to the steering wheel is possible when bumps, chuckholes, etc., are encountered. Trucks handle more easily, more speedily, and with less operator fatigue.

For further information regarding the versatility and other advantages of these Vickers units, ask for the following bulletins: Vickers Vane Type Pumps . . . Bulletin 36-12; Vickers Multiple Unit Valves . . . Bulletin 40-13; Vickers Power Steering Booster . . . Bulletin 47-30.

ICKERS Incorporated . 1428 OAKMAN BLVD. . DETROIT 32, MICHIGAN

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ENGINEERS AND
BUILDERS OF
OIL HYDRAULIC
EQUIPMENT
FOR 27 YEARS

### **General News**

(Continued from page 79)

#### 1949 Ford Model Changeover Now Underway

Changeover operations to 1949 Ford models is underway at all Ford plants and is expected to be completed by May 1. The company has started layoffs which are expected to be fewer and for shorter periods than for any other major model change-over in Ford history. Between 20,000 and 25,000 workers will be affected at the Rouge, and an additional 8000 at the 14 branch plants. Many layoffs will not be for longer than two weeks, and fewer will be for more than six weeks. Changeover at the Lincoln plant has been completed and employes began returning to work March 1. The Mercury changeover is also nearing completion, and production is already underway on the first thousand pilot models. The Lin-

coln will be announced to the public the first week in April and the Mercury about two weeks later.

## Packard Reports '47 Profit Of \$1.1 Million

Packard Motor Car Co. has reported a net profit of \$1.1 million for 1947. Factory operating loss last year was \$4,953,808, but earnings of \$3,454,499 by zone offices, sales branches, and subsidiaries, and an estimated refund of \$2.6 in federal income taxes for previous years brought net income to more than \$1 million. In addition, return to surplus of more than \$2.8 million in reserves provided in previous years and no longer required brought the total added to earned surplus to \$3,912,325.

## K-F Develops Light Metals As Steel Substitute

Kaiser-Frazer Corp. has under wav considerable development in the use of light metals to replace scarce steel in its automobiles. A progress report on this development was given by Clay P. Bedford, vice-president in charge of manufacturing before the Cleveland chapter of the American Society of Tool Engineers. The company is already tooling for production of aluminum gas tanks for about one third of its production and should be in full output early in March. The company also has under test sandcast magnesium wheels, and is also conducting tests on die cast magnesium wheels. It appears, however, that both are uneconomical for mass production at the present time.

Mr. Bedford said that dies for die cast aluminum door frames will be ready for production runs in June, but that this does not necessarily mean the company will begin immediately installing aluminum die cast door frames on its cars. A steel skin would be hemmed into an envelope over the die cast aluminum frame. He said the estimated cost of the steel outer panel and die cast inner frame is about the same as that of doors made under K-F's standard methods, if the additional freight cost for raw steel shipped from California is considered. The company also plans to make dies for die castings for instrument panels, and also will attempt to use the combination die cast frame and steel skin for deck lid manufacture.

#### Mack's 1947 Output Breaks 47-Year Record

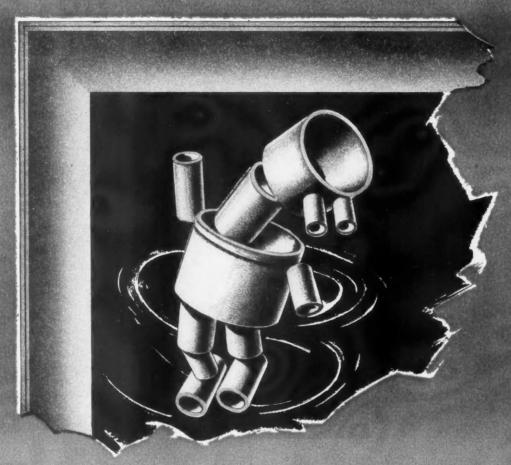
Mack Trucks, Inc., recently disclosed that 1947 was the largest production year in its 47-year history. Trucks, buses, and fire apparatus produced in 1947 totaled 20,876 units with strong emphasis on trucks.

(Turn to page 194, please)









# A Doofinannie Casting?

Quite likely the dufunannie could be cast in the Campbell, Wyant and Cannon Foundries. Although the dufunannie has no practical value, being purely an imaginary product, it serves to illustrate the immense variety of parts that C.W.C. is capable of casting in volume production. It also exemplifies the successful production of intricate castings in which C.W.C. has long specialized.

Research development, metallurgical

control, scientific foundry practice and modern foundry facilities all contribute to C.W.C.'s ingenuity in the economical and practical production of many types of steel, grey iron and alloy castings.

And a most important specialization
... as interpreted by our dufunannie ...
are centrifugally cast, cylindrical products of many shapes and sizes.

May we give you complete information and quotations?

#### CAMPBELL, WYANT AND CANNON FOUNDRIES

SAUSKEEON, MICHIGAN: Henry Street Plant . Sanford Street Plant . Broadway Plant COLITER MAYER, MICHIGAN: National Motor Castings Dio. . LANSING, MICHIGAN: Centrifugal Fusing Co.



CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY
MUSKEGON, MICHIGAN

#### **General News**

(Continued from page 192)

#### Name Appel Purchasing Head Of Willys-Overland

Walter D. Appel, formerly chief engineer of Willys-Overland, has been appointed director of purchasing for the company. Prior to his appointment as chief engineer in January, 1947, he was assistant to the vice-president in charge of engineering. Robert Busey will assume the responsibility of acting chief engineer.



#### MORE FUTURAMICS

These three 1948 Futuramic Series 98 Oldsmobiles have reached the end of the final inspection lines in the main assembly plant of GM's Oldsmobile in Lansing. Mich. It is expected that a production rate of over an over an Oldsmobile a minute will be achieved when output here hits top speed.

#### New Highs Set in 947 for Automotive Casings

Production and shipments of automotive casings in the year 1947 surpassed any previous year in the history of the industry. Production of 95,548,391 casings in the year topped by 13,250,210 units the production figures for 1946 which was in itself a record year. The Rubber Manufacturers Association disclosed recently. Shipments during the year totaled 91,194,274 casings, an increase of almost 11 per cent over the previous year.

Passenger casing production for the year totaled 77,790,410 units, as against 66,466,319 units in 1946. Shipments in 1947 were 74,116,801 units compared with 66,423,221 units in 1946. Replacement shipments in 1947 were approximately on the same level as in 1946, while the increase in the production of passenger cars accounted for an increase in original equipment shipments of approximately 8.5 million casings. Exports increased to 1,607,654 casings as against 652,643 the year before.

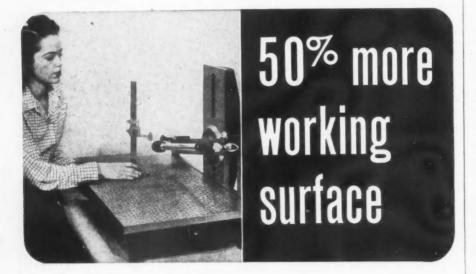
Production of truck and bus casings in 1947 amounted to 17,757,981 units, as compared with 15,831,862 units in 1946. Shipments in 1947 were 17,077,473, an increase of over seven per cent above 1946.

Automotive tube production in 1947 was slightly higher than 1946 with 79,509,292 tubes, as against 77,250,995 in the previous year. Shipments were maintained at approximately the level of 1946 with a total of 76,641,381 moving from the factories in 1947.

#### Studebaker Truck Assembly Moved Into New Plant

Studebaker Corp. is moving its entire truck assembly including fabrication of cabs and pick-up bodies to the aircraft engine plant it recently bought from WAA at South Bend. Truck assembly will require about one half of the 28-acre plant which Studebaker bought for \$3,592,000. All truck building operations, except engine manufacture, will be centered in the new plant.

(Turn to page 196, please)



#### WITH MERZ UNIVERSAL CHECKING PLATES

MERZ Universal Checking Plates are of unique design, with all attachments connected on the outside. The result is 50% more working surface—an advantage found only in MERZ.

You can depend on Merz Checking Plates and Fixtures to speed up complicated checking operations. Bench centers and "V" blocks are fitted by exclusive design, with angle groove in master plate and attachments. This maintains positive pressure against edge and surface at all times. Various attachments, including a 20" sine bar fixture, offer a wide range of checking combinations not available with standard units.

MERZ Universal Checking Plates and Fixtures are cast from special, fine-grained gray-iron alloys—are extremely rigid and unconditionally guaranteed against warpage. Available in a wide range of sizes to meet every requirement.

MERZ builds a complete line of precision inspection equipment, including AGD standard plugs and gages and well-known New-Matic Measuring Machines, Taper Gages and Automatic Sorting Machines, Write for illustrated technical data.

MERZ ENGINEERING COMPANY . INDIANAPOLIS 7, IND.



# PRODUCTION 4 Times as Fast WITH ARO TOOLS



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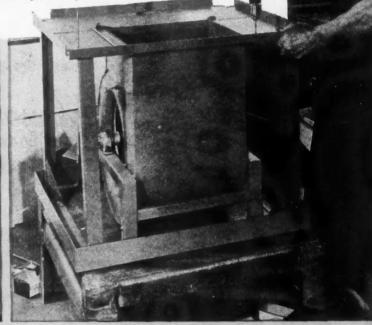
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400 units—compared with 94—in the same period of time! That's the result when a nationally known manufacturer of home oil and gas furnaces equipped his assembly line with Aro Air Screw Drivers and Drills.

Similarly, companies in many lines from coast to coast are getting results in increased production, less fatigue and lower costs! Possibly Aro Tools could do as much or more for you. A nearby Aro Field Engineer will gladly help you with problems in screw-driving, nut-setting, drilling, grinding, sanding, polishing and other operations. Just write or wire . . . The Aro Equipment Corporation, Bryan, Ohio.

Actual photos of assembly line.





ARO AIR TOOLS

ARO

Send for Catalog!

THE ARO EQUIPMENT CORPORATION, BRYAN, OHIO
Without obligation please send us your new fully illustrated Air Tool Catalog
No. 46 which also gives complete specifications on all Aro tools and accessories

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Street .

City.....State....

Stocked by Aro distributors everywhere

### **General News**

(Continued from page 194)

#### Announce New Chrysler Trucks For Export

A completely new line of Dodge, Fargo and DeSoto trucks, comprising 248 basic chassis models ranging from 4850 to 23,000 lb GVW and up to 40,000 lb GTW, was announced recently by L. L. Salsinger, truck sales manager of the Chrysler Export Div. Front axles have been

moved back and engines have been moved forward to place more of the gross vehicle weight on the front axle and provide better weight distribution. The wheelbase for conventional models through the 16,500 lb GVW classification has been reduced eight in., while those models ranging from 18,500 through 23,000 lb GVW have been reduced six in. The new trucks have been engineered so that despite the shorter wheelbases the cab-to-axle dimensions remain practically unchanged, making it possible to use the same length bodies as before.

#### Motley to Speak at Toledo SAE Regional Meeting

Over 500 engineers and technical men are expected to attend the regional meeting in Toledo, O., of the Detroit Section of the Society of Automotive Engineers on March 29. Arthur H. Motley, president and publisher, Parade Magazine, will be the principal speaker. Daniel H. Kelly, executive vice-president, Electric Auto-Lite Co. will be the toastmaster. C. S. McIntyre, vice-president, Monroe Auto Equipment Co., and SAE vice-chairman in charge of regional activities, and D. D. Robertson, assistant sales manager, Spicer Manufacturing Co., and assistant SAE vice-chairman have announced other arrangements which indicate that the meeting will be the largest of its kind ever held in Toledo.

#### Ford Consolidating Small Michigan Parts Plants

Ford Motor Co. is continuing consolidation of outlying small parts plants in Michigan. Manufacturing operations at its Milan and Phoenix, Mich. plants will be moved to the Ypsilanti plant this month. Manufacture of ignition coils at Milan and production of voltage regulators and cut-outs formerly made at Phoenix henceforth will be carried on at Ypsilanti, which is headquarters for the parts and equipment manufacturing division.

# Rubber Companies Reduce Tire Building

Following a sharp decline in sales during January and February, Goodyear Tire & Rubber Co. slashed production schedules by 30 per cent. The company says that the move does not necessarily mean that the bottom has dropped out of the market, but that the big postwar demand has finally been filled. Other tire producers also have reduced schedules. It is estimated that one major producer will now turn out about one-third fewer truck and large size passenger tires and about seven per cent fewer popular sized passenger tires.

#### Kaiser-Frazer Altering Press Shop Layout

Kaiser-Frazer Corp. is altering the layout of its press room coincident with the installation of 10 new presses. Seven large presses will be relocated for more economical operations, and to provide more room for installation of six additional presses later. The new arrangement will help to make K-F more self-sufficient as far as body stamping goes. A new overhead conveyer system will be installed to carry stampings between presses and to transport small parts to painting and metal finishing departments.

(Turn to page 199, please)

# The Best Combination for FINE ENGINE PERFORMANCE



The Johnson Self-Locking Tappet Screw is made from the finest Steel, accurately heat treated to give it toughness and long life. The flexible spring action of the diaphragm holds the threads fully and rigidly seated at all times. The entire load is carried by the solid portion of the screw.

The Johnson Self-Locking Tappet Screw has no leading edges and is not self-tapping. Effectiveness is maintained through any number of adjustments.



Write today for the latest Johnson TAPPET BULLETIN.

Gohnson PRODUCTS INC.

MUSKEGON, MICHIGAN

"Tappets Are Our Business"

# Now you can your own...



# with an A.E.F. Medium Wall Tube Mill...

FOR LOWER COSTS and an adequate supply of pipe and tubing, roll your own on an A.E.F. Tube Mill! The capital investment and the operating cost are so comparatively low, any concern having an outlet for tubing or pipe from 15,000 to 45,000 feet per day can save enough money in less than one year's operation to return their original investment.

The Medium Wall Mill illustrated will produce both American Standard weight pipe, 1/2" through 2", and mechanical tubing up to 4" O.D. for such uses as: gas and fluid conveying lines; tubular parts for automobiles, trains, aircraft, farm machinery and industrial equipment; bicycle and furniture frames; electrical conduit; structural members for building, construction and industrial requirements; etc. Other models briefly described on the back of this page.

A.E.F. engineers will be glad to discuss fully the mechanics and economics of this equipment with you and are prepared to help you plan and make an A.E.F. Mill installation, put it into operation and train your operators.

AMERICAN STANDARD WEIGHT PIPE 1/2" TO 2"

MECHANICAL TUBING UP TO 4" O.D. (maximum wall thickness .156")

Perfectly formed, electrically welded, scarfed, sized, straightened and cut to length in one continuous, automatic operation at speeds up to 65 ft. per minute, depending on diameter size and wall thickness.

Write for literature and information.

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RICAN ELECTRIC FUSION CORPORATION

2610 DIVERSEY AVENUE

CHICAGO 47. ILLINOIS, U.S.A.

Cable Address: AEFCORP, Chicago

# BRIEF FACTS

#### 7-STEP FORMING

The seven stages in forming flat strip into tubular form on an A.E.F. Medium Wall Mill are illustrated at the right. Four sets of side forming rolls are also furnished. Following the welding operation, finishing and sizing are accomplished by means of five additional sets of rolls-producing perfectly rounded pipe or tubing.

#### WORKABILITY

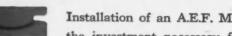
The finished pipe or tubing possesses the same strength and qualities as the original strip from which it is formed and the welded seam has a greater strength than the parent metal. It can be swaged, drawn, bent, upset, flanged or worked into special shapes without danger of fracture at the welded seam.

#### MEETS PIPE SPECIFICATIONS

Pipe produced on an A.E.F. Tube Mill will meet all pressure tests and specifications for electrically resistance welded American standard weight pipe.

#### Resistance **Welding Machines**

Modern A.E.F. Resistance Welding Machines, Tube, Spot, Seam, Butt Welders are built in a modern, completely air conditioned factory.



Installation of an A.E.F. Mill represents a fraction of the investment necessary for comparable production of pipe or tubing by any other method.

#### **BUILT IN THREE SIZES**

COSTS LESS

- 1. 60 KVA Light Wall Mill produces tubing with wall thicknesses from .025" to .093" and outside diameters from 1/2" to 21/2"; with slight modification at factory, limits can be extended to make tubing up to 3" O.D.
- 2. 170 KVA Medium Wall Mill produces American standard weight pipe from 1/2" to 2", as well as mechanical tubing up to 4" O.D. with maximum wall thickness of .156".
- 3. A.E.F. Heavy Wall Mill produces tubing up to 6" O.D. Detailed information on request.

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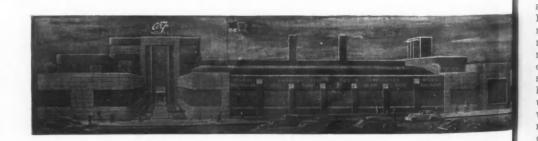
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#### DATA ON REQUEST

For complete data and literature on A.E.F. Tube Mills, submit information regarding the sizes and quantities of pipe and tubing required, and the uses for which it is intended.



CAN ELECTRIC FUSION CORPORATION

2610 DIVERSEY AVENUE

CHICAGO 47, ILLINOIS, U.S.A.

Cable Address: AEFCORP, Chicago

## **General News**

(Continued from page 196)



The opening of the new Chevrolet assembly plant in Los Angeles was brightened by the effect of 20 60-in, searchlights. A record-breaking open house was attended by 58,922 persons in three five-hr periods.

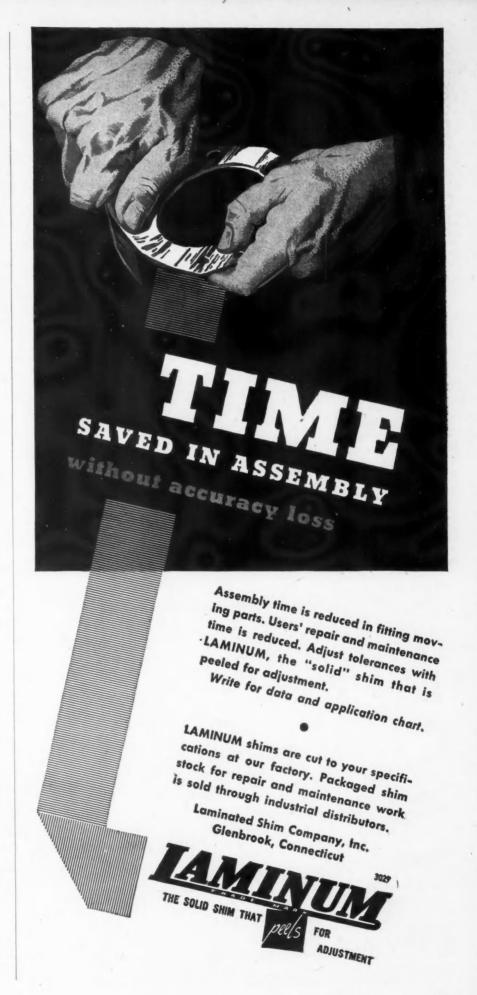
#### K-F Eliminates Second Shift Operation

Kaiser-Frazer Corp. aroused a great deal of discussion in Detroit late in February when it announced that it was cutting of its second shift operation as an economy move. The company intimated that the breakdown in its stock issue was at least partially responsible for the cutback in production. K-F had planned to issue 1.5 million shares of common stock to finance expansion of production to 1500 cars a day. Under the cutback an estimated 3200 employes will be laid off, 2400 at Willow Run, and 800 at the Detroit Engine Div. Production will be cut from a high of 1100 cars a day to between 700 and 750. The plant was down the first week in March to permit adjustments to the new schedules.

Despite the cutback in production, K-F plans to earn as much in 1948 as it did in 1947, according to Edgar F. Kaiser, vice president and general manager. He said that K-F earned more than \$22 million in the last nine months of 1947, mostly on one-shift operation, and that earnings in 1948 should be equal to that figure. It is known that between 20,000 and 25,000 unsold cars are in dealers hands which, although not excessive under normal conditions, indicates that dealers are having difficulty moving cars at their current high prices.

# Ford Approves Automatic Fan As Accessory

A thermostatically controlled fan, the Dynamatic Radiator Fan, has (Turn to page 200, please)



### General News

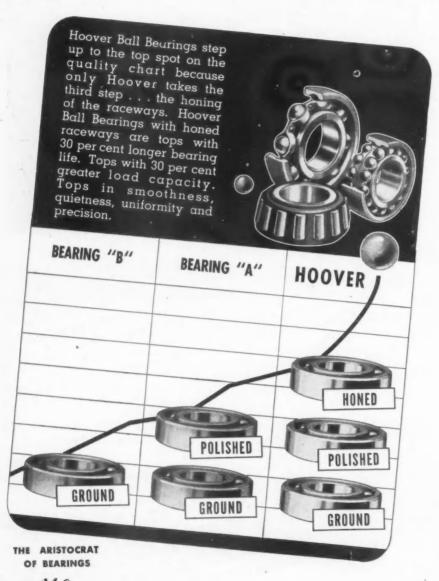
(Continued from page 199)

been approved by Ford Motor Co. as an accessory for passenger cars. The fan is controlled by a thermostat, installed in the radiator hose, which regulates the flow of current to the electrically controlled clutch, which in turn puts the fan into operation only when required to provide engine cooling. In cold weather the fan seldom turns on, providing faster warm-up of the engine. The company says the unit saves fuel and supplies hot water for the heater more quickly. Another advantage is



Originally a farm tractor, Goodyear mechanics replaced the front tires on the Ford 8N tractor, shown towing a plane at the Akron airport, with 6.50-16 casings. An adapter to carry airplane towbars was added, and back up lights were installed for night operations.

# Tops on the quality chart



HOOVEN America's only Ball Bearing with HONED RACEWAYS

ANN ARBOR, MICH. HOOVER BALL AND BEARING CO.,

that engine power required to operate the fan is saved when it is not in use

#### White Made Assistant To Tucker

D. McCall White has been appointed special assistant to Preston T. Tucker, president of Tucker Corp. He will be in charge of engineering, inspection, and testing. Mr. White was with Cadillac Motor Car Co. from 1914 to 1920 and helped develop the early Cadillac engine.

#### Ford Expands Activities In Market Research

Ford Motor Co. is currently developing a large new market research program said to be much more extensive than anything now existing in the industry. Details of the program are still confidential, but it is known that it is being carried on in cooperation with Northwestern University, University of Michigan, and Syracuse University. The company recently announced the appointment of Dr. Joseph A. Russell, associate professor of geography, Syracuse University, as geographical consultant to the marketing research department. He will continue his teaching duties while serving as consultant to H. D. Everett, Jr. director of marketing research.

#### See Small Competition From English Cars

Competition by British automobile truck manufacturers in the American market will apparently not amount to much this year. English output in 1947 was only about 300,000 units, and it is expected to be considerably less this year. Adverse factors affecting British production are lack of steel and excessive import restrictions on British cars and trucks imposed by many countries. Production workers at many English companies have been laid off in large numbers with one company reducing its force 80 per cent.

(Turn to page 202, please)

# FOR D-BUILT ENGINES

RIGHT WAYS!

RIGHT POWER

for your job in the Ford Industrial Engine line! When you apply power to any industrial job or equipment, pick FORD power... and know it's right three ways! Ford Industrial Engines are available as partial assemblies or completely built up, ready for the job. For new engine data sheets, send postcard.

RIGHT FEATURES

... the best of the new, right from Ford Industrial Power "Headquarters"!

#### RIGHT SERVICE

. . . right around the corner from you . . . at Ford Dealers everywhere!

#### FORD MOTOR COMPANY

INDUSTRIAL AND MARINE ENGINE SALES DEPARTMENT

3510 Schaefer Road • Dearborn, Michigan

Listen to the Ford Theater, Sunday afternoons, NBC Network. See your newspaper for time and statlow.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

## **Picture of Progress**



Hodizing Aluminum Assures corrosion resistance -- tough paint bond -- durability -- Beauty



The new ACP process using "Alodine"\* takes but 2 minutes by immersion—or 30 seconds by spray in a power spray washer. No electricity—no high temperatures—no elaborate equipment—no special skill, necessary.

"Alodine" imparts maximum protection to either painted or unpainted aluminum—provides a durable bond for tenacious finish adhesion.

Alodizing is simple, effective and economical—in large or small, intermittent or continuous production.
Additional data available on request.



## **General News**

(Continued from page 200)

#### Briggs & Budd Redivide Chrysler Stampings

It has been reported recently that the Budd Co. of Philadelphia has taken over a large segment of the Chrysler 1949 model business. A check reveals, however, that Briggs will still continue to be a major supplier to Chrysler, but that there has been some realignment of work between Briggs and Budd. Under the new arrangement it is said that Budd will do all of the stamping work for one of the divisons and that Briggs will supply all the needs of another. Formerly the work was spread be-tween the two companies by both divisions. It is understood that the reason for the change is that in the event of a stoppage in one or the other of the two supplier plants, only one division would be affected.

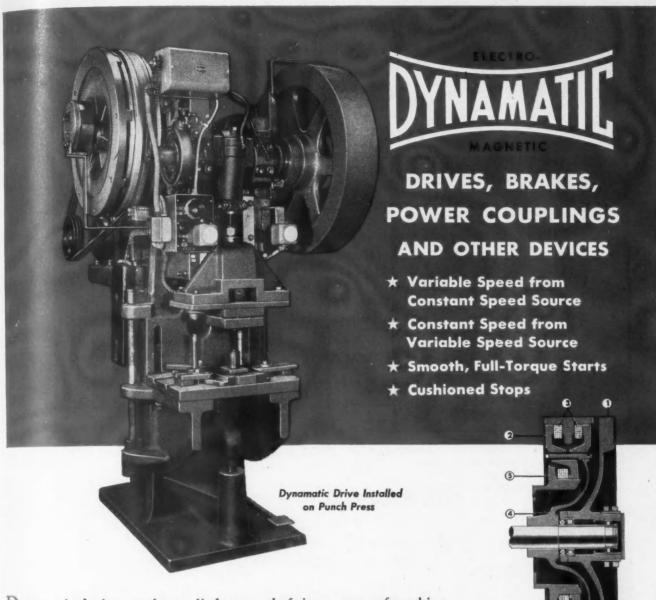
## Nuffield to Make Bodies in Australia

A plant for the production of automobile bodies is being set up on the Victoria Park race track in Sydney, Australia by Nuffield (Australia) Proprietary, Ltd. Covering 100,000 sq ft, the plant will be completed in eight months, and operating in a year, it is expected. Bodies for three models of Morris passenger cars and for commercial vehicles will be produced. Farm tractors will be produced. Farm tractors will be built at a later date. Lord Nuffield, head of Morris Motors, Ltd., Great Britain, bought the Victoria Park track for about \$650,000 in 1945.

#### Form International Group of Automobile Engineers

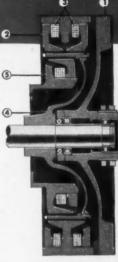
An international grouping of Automobile Engineers' Societies has been formed in Paris under the title of International Federation of Societies of Automobile Engineers and Techniciens. The nations represented are United States, Great Britain, France, Italy, Poland and Czechoslovakia. Mr. Henry Lowe Brownback represented the U.S.A. The Federation proposes to expedite the exchange of documents and working program" between the different nations and among other things, to work towards the standardization of automobile accessories and to eliminate the difficulties against the use of automobiles in foreign countries.

(Turn to page 206, please)



Dynamatic devices can be applied to any shaft in any type of machine to transmit motion from one rotating member to another without mechanical contact, without friction, without shock, and under complete control.

Utilized as a variable speed drive, power coupling, slipping clutch, or brake, the Dynamatic principle has a wide range of applications in many industries. It furnishes a simple, compact, frictionless means of power application which is under instantly responsive control. Sizes range from the tension control on a nonbacklash casting reel to an 18,000 horsepower drive for a wind-tunnel blower. Inquiries are invited.



Basically, Dynamatic devices consist of two rotors, one operating inside of, but not touching the other. One of the rotors is an electro-magnet. Either rotor may be connected to the driving or the driven member. Direct current field coils located in one rotor produce eddy currents in the second rotor, exerting pull on the first. Slippage between the rotors is controlled by varying the current applied to the field.



CORPORATION - KENOSHA, WISCONSIN

Subsidiary of EATON MANUFACTURING COMPANY Cleveland, Ohio

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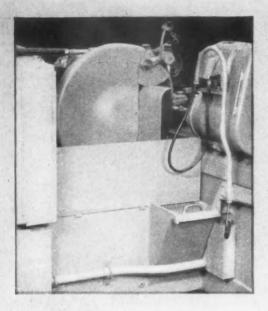
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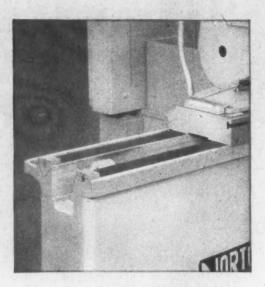
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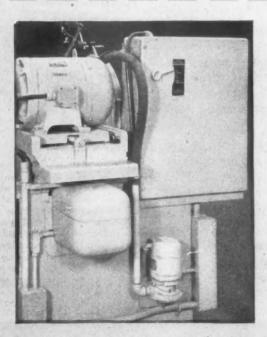
# Here are the features production men like



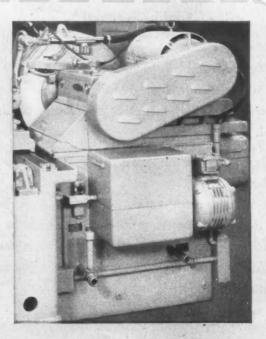
Rear base design offers maximum accessibility to hinged guard for wheel change. Note ramped outlet for easy sludge removal.



Steel ribbon type guards provide complete protection of base ways and reduce grit infiltration. Neat and compact, they require no extra floor space, and allow a more rigid table design.



Electrical equipment servicing made easy. Major controls located in elevated, accessible cabinet. Note rigid conduit.



Pumps and motors mounted outside base to insure convenience and minimum time consumption in maintenance and service.

# ...in the Norton type ctu Cylindrical Grinders

INE all around service — whether on high production, or on job lot runs — is delivered by the new NORTON type CTU 6" and 10" Cylindrical Grinding Machines.

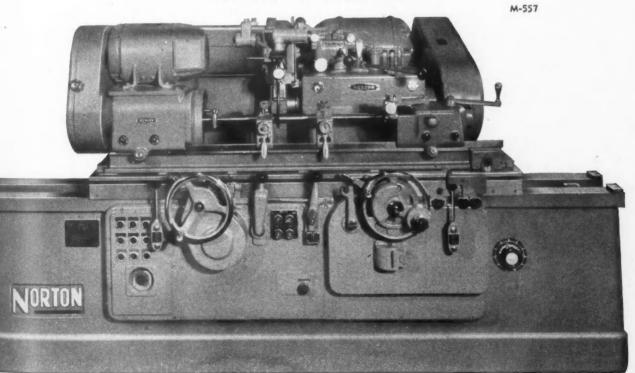
They have increased rigidity through new features in design. This rigidity fortifies their unique ability to stand up under heavy service. It also prolongs the fine quality of precision they offer.

Easy loading, the many new features described on the opposite page, plus new flexibility and the scientific positioning of controls, all make for greater operating ease, and for the very important factors of low work and maintenance costs.

NORTON 6" and 10" Type CTU machines are made in plain and semiautomatic arrangements — write for catalog.

#### NORTON COMPANY, WORCESTER 6, MASS.

New York - Chicago - Detroit - Cleveland - Hartford
Distributors in All Principal Cities

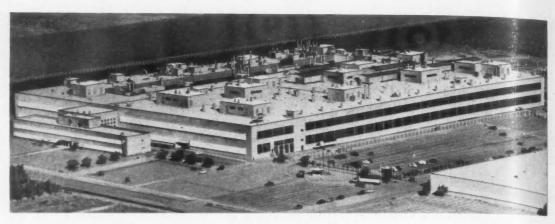


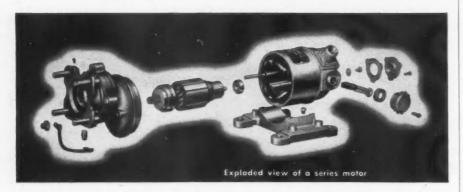
The NORTON 10" x 36" Type CTU Semiautomatic Cylindrical Grinder

NORTON GRINDERS

#### SECOND FOR CHEVROLET

Viewed from the air, this new plant was recently put into operation by GM's Chevrolet Motor Div. in Los Angeles, Calit. The second post war assembly plant built by Chevrolet, it by Chevrolet, it featured suspended assemly and "Brazilian sunshades," a new method of temperature control in hot weather.





EVERY PART ENGINEERED FOR THOROUGH DEPENDABILITY...

# Lamb Electric MOTORS



Base-mounted, explosion-proof aircraft geared fuel transfer pump motor.



Rugged construction is a major factor in the reliability of this motor widely used in the field of mechanized equipment.

Careful designing and manufacturing backed by rigid testing assure thorough dependability of every part in a Lamb Electric Motor and result in satisfactory performance.

Because of this standard of dependability and performance, Lamb Electric Motors are being teamed up with more and more of America's finest products.

# THE LAMB ELECTRIC COMPANY KENT, OHIO

Lamb Electric

SPECIAL APPLICATION MOTORS

## **General News**

(Continued from page 202)

## Standard Tube Moves to New Plant in Detroit

Standard Tube Co. has moved into its new plant in west Detroit and is continuing production of automotive products. The company had previously occupied space in the Ford Highland Park plant, but was ordered to vacate last March. Construction began in July and the building was completed enough for operations to begin by December of last year. It contains 145,933 sq ft of manufacturing space and is estimated to have cost approximately \$1,250,000.

## Caterpillar Introduces Two New Bulldozers

Two new hydraulic controlled bull-dozers, designed for exclusive use with the Diesel D2 track-type tractor, have been placed in production by Caterpillar Tractor Co. The new earthmoving tools, the No. 2A, angling blade, and the No. 2S, straight blade, bulldozers, are the first designed for use with, and matched in capacity to the power of, the D2 tractor. The No. 2A and No. 2S round out the line of bulldozers manufacturered for exclusive use with the Diesel track-type tractors produced by International.

#### Cities Service & M. W. Kellogg Join In Fuel Research

Quietly in effect since 1946, a merger of the synthetic fuel program of Cities Service Co. with that of the M. W. Kellogg Co. was recently revealed. An announcement that Kellogg is prepared to license synthetic fuel plants on behalf of both companies was also made. Cities Service has been interested in the production of chemicals from natural gas for some time, and Kellogg has approached the problem from the standpoint of synthesizing liquid fuel and by-product chemicals from natural gas.

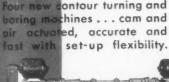
(Turn to page 208, please)

# PRODUCTIVITY

Model 601



Model 36 Four new contour turning and



Model 365

The only screw machines you can buy today which measure up to the cutting tools of tomorrow. Two lines, seven models, 4-6-8 spindles, capacity to 24".

A complete line of MODELS

The world's standard in open end, work rotating, chucking machines, 4, 6 and 8 spindles, capacity to 12", supplemented by double end and tool rotating chuckers. Utmost efficiency for any chucking job.

Model 61



Model 150

A new line of si automatics, engi carbides and f for economical production of la from bar or tul



Model 98



Model 65

Have you considered the enormous, new possibilities nave you considered the enumber, new pussioners of automatic machinery? Are you robbing yourself of the cost-cutting tools your competitors are adopting?

We will gladly supply catalogs and specific case
histories to show you how others are using New Britain Automatics to broaden profit margins.

NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE.



Model 23A



BRITAIN

Automatics

NEW BRITAIN-GRIDLEY MACHINE DIVISION NEW BRITAIN, CONNECTICUT

March 15, 1948



You say-Only by more output can costs be cut!

All right-compare T. & M. studies on your present equipment with this new 20" Sibley drilling and tapping machine. We can tell you now the difference will surprise you!

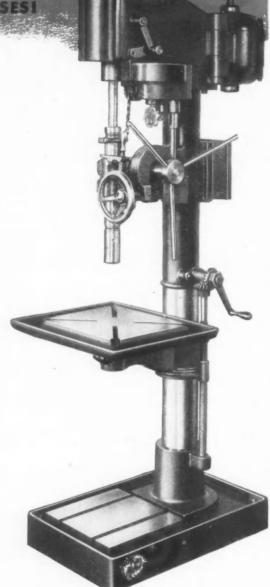
Here is a shop machine designed by shop men. You have easy access to controls -turn a dial to select the proper geared power feed. A lever allows convenient shifting of V-belt. This Sibley is a precision tool for sensitive drilling at high speeds, but has ample power to drill 11/2" in mild steel. 8 speeds range from 65 to 1360 RPM, driven by a 2 H.P. motor.

SEND FOR CATALOG NO. 67. Get complete details to compare with present equipment.



NAME ADDRESS

CITY



Designed to help you . challenge rising costs!

BLE MACHINE & FOUNDRY CORP.

22 EAST TUTT STREET
SOUTH BEND 23, INDIANA

# General News

(Continued from page 206)

#### Pyrene Mfg. Co. Recalls 500,000 Extinguishers

The Pyrene Manufacturing Co. today called in more than half a million of its hand fire extinguishers. An elusive and persistent corrosive in the extinguisher fluid—supplied to Pyrene by an outside manufacturer—has severely damaged some of the recalled extinguishers and would probably affect others in time, explained the company.

#### Used Car Market Slips In Recent Weeks

The used car market has slipped badly in recent weeks. Dealers are not certain whether the extremly hard winter or the generally tightened up economic situation is responsible, but the common belief is that both are large factors. The dealers be-lieve that with the coming of warm weather the market will revive to some extent but are not looking for it to come back to levels prevailing late last year. The market is particularly bad in the larger late model field, especially in some makes. A Detroit dealer recently bought a newly-styled 1948 model with 1800 miles on it for \$140 less than the seller had paid a few weeks previously. He said that he also had bought another high-priced low mileage 1948, also with the new styling, for \$400 under the dealer price. Another indication of the tightening market in the high priced field is that some new cars selling in the near-\$3000-and-up class are available for practically immediate delivery in some places. Further evidence that the economic picture is not as good as it was a year ago comes from the Michigan Secretary of State's Office which reports that in Wayne County repossessions of used cars in January were up 115 per cent over the same period a year ago.

#### Sir Wm. Rootes to Visit Western Hemisphere

Sir William Rootes, head of the Rootes organization, will reportedly soon be visiting the United States, Canada and South America in an attempt to increase the sale of Rootes group automobiles in those areas.

(Turn to page 210, please)

#### AUTOMOTIVE **INDUSTRIES** is the

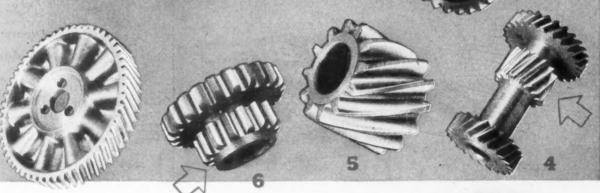
INDUSTRIAL NEWS MAGAZINE

# Actual Gear Shaving Production Figures 25 seconds 20 seconds

15 seconds 28 seconds

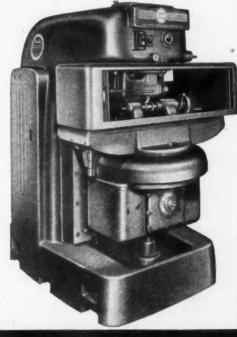
As a gear manufacturer, you are familiar with the gear shaving process to correct index, helical angle, tooth profile, eccentricity and objectionable surface roughness.

You may not know how much the new Red Ring MASUM! Gear Shaver has contributed to the speed and economy of this process. Just look over these actual production figures which are typical.



Gear	Material	Dia.	Face	Teeth	DP	Stock Removed over Pins	Machine Time
1	Steel	4"	11/16"	29	9.25	.010"	30 seconds
2	Steel	35/16"	1"	23	10.5	.010"	23 seconds
3	Cast Iron	25/16"	11/6"	28	10	.010"	20 seconds
4	Steel	21/4"	13/8"	14	7.6	.009"	28 seconds
5	Steel	11/8"	1"	12	13.5	.005"	9 seconds
6	Steel	29/16"	11/16"	14	6/8	.006"	15 seconds
7	Aluminum	61/2"	1"	56	10	.010"	25 seconds

For further information write for Bulletin S47-3 or, better still, consult a Red Ring Engineer.





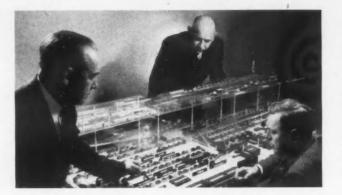
NATIONAL BROACH AND MACHINE CO. 5600 St. JEAN . . . . DETROIT 13, MICHIGAN

## **General News**

(Continued from page 208)

#### GM Opens New Plant In Framingham, Mass.

General Motors B-O-P assembly plant at Framingham, Mass. went into production early this month. The plant, which will turn out cars for the New England market, is currently building Pontiacs and Oldsmobiles with Buicks to be added later. Hourly production at full operation will be 34 cars.



### RISHER

Presenting a detailed visual layout of
the entire operation, this model of
the new GM Fisher
Body plant in Van
Nuys, Calif. is exact
in scale and detail.
Nearly 500 miniature bodies ore on
the assembly line in
as to coach, coupe.

#### K-F Gets \$10 Million Loan For Short-Term Capital

Kaiser-Frazer Corp. has arranged for a \$10 million loan from the Bank of America to finance short range working capital requirements. A company spokesman said that the loan has nothing to do with K-F's plans for permanent financing. The company had paid off in late December a \$12 million loan from the Bank of America obtained in Feb. 1947.

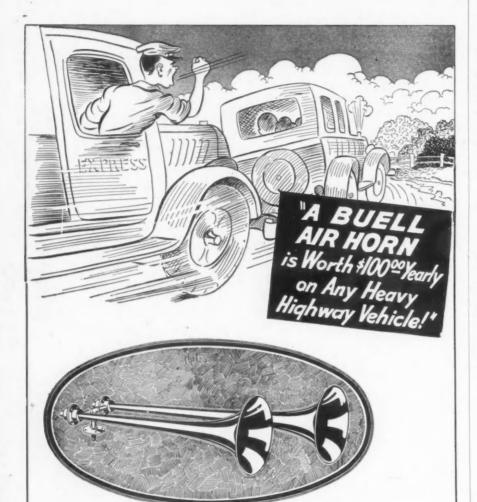
#### Automotive Exports Drop From Year Ago

Automotive export figures for January show that shipments of vehicles to foreign markets were sharply under those of that month a year ago. AMA reports that 35,408 units, or 8.8 per cent of total production went to export markets during January. The total consists of 19,703 passenger cars and 15,705 trucks and coaches. Total for the same month a year ago was 42,452 units consisting of 19,910 passenger cars and 22,542 trucks and busses.

#### Detroit Hit New Highs For Gas & Electricity Use

That the Detroit area is well described by the word dynamic is clearly shown by some recently released statistics from The Detroiter, which is published by the Detroit Board of Commerce. As of Dec. 31, 1947, 6.4 billion kwhr of electricity were generated or purchased annually from the Detroit Edison Co. as contrasted with 5.3 billion kwhr at Dec. 31, 1946. The Michigan Consolidated Gas Co. reported that natural gas sold in the Detroit district for the year ending Dec. 31, 1947 amounted to 46.7 billion cu ft as compared with 37.4 billion cu ft in 1946. Interestingly enough, the 1947 figures for electricity and gas consumed surpassed those for all previous years-even the war years.

(Turn to page 212, please)

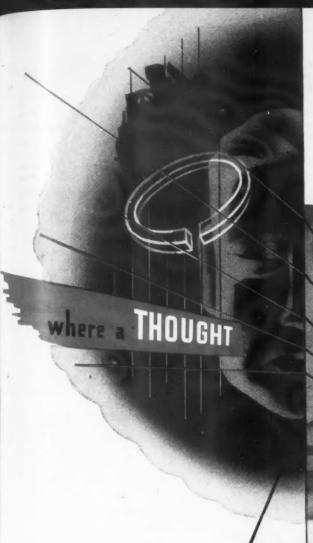


- Buell Air Horns are tops in warning signal efficiency.
- Installed as original equipment on many Trucks and Buses.
- They reduce maintenance costs by decreasing stops, starts and slowdowns.
- All records prove that they save tires, brakes, clutches and gears.
- Cut gas and oil consumption

With a Buell the driver has greater security, maintaining a steady cruising speed. Slowing a 20 ton load from 50 MPH to 30 MPH means destroying a lot of energy thru brake lining and tires. It is replaced by burning more gasoline, increasing load on engine and tires again, to regain speed. This all costs money. We believe a Buell Air Horn is worth \$100.00 yearly on any heavy highway vehicle. Then remember a Buell will last more than 10 years. How would you rate a \$100.00 investment that earned \$100.00 yearly for 10 years. Ask the man who has a Buell,

#### BUELL MANUFACTURING CO.

2979 Cottage Grove Ave., Chicago 16, III.



RAMCO

Piston Rings

Automotive...Industrial...Aircraft





required of the automotive engineer who creates an engine design. His ideal is perfection. In his endeavors to approach perfection, he has at his command the specialized service of RAMCO. This places at his finger-tips tylenty years of specialization and

This places at his finger-tips twenty years of specializati research in the piston ring sector of engine design.

Then, when "the thought becomes a ring"... the resultant finished Ramco Ring is as nearly perfect as decades of experience and the latest and finest of equipment can make it; as near perfection as specifications require, even when these specifications call for the most exacting parallelism and flatness with surface finishes in micro inches.

Ramsey Corporation, 3704 Forest Park Blvd., St. Louis, Mo. Factories: St. Louis; Fruitport, Mich; Toronto, Ont., Canada.



RIVITORS ... AIR AND HYDRAULIC CYLINDERS ... CUTTERS ... CLINCHORS

### **General News**

(Continued from page 210)

#### GM Plans To Reopen Opel Plant

General Motors Corp. is reported to be exploring the possibility of reopening its Opel factory at Ruesselsheim, Germany. A report from the American military government in Frankfort says that GM officials are investigating the situation to see how soon the plant can be taken out of property control and made ready for full scale production.

### Name Altman Vice-President Of Continental Motors

Peter Altman, consultant to Continental Motors and chairman of its engine council for the past five years, has been appointed vice president in charge of its newly organized Multitool Div. He was head of the aeronautical engineering department at the University of Detroit for 12 years, and later served with Aviation Mfg. Corp. and Consolidated Vultee. He also has acted as engineering consultant for many other companies.

#### K-F Leases Plant For Parts Storage

Kaiser-Frazer Corp. has leased a surplus war plant from WAA at Adrian, Mich. and has started to occupy it. The government-owned aluminum extrusion plant will be used for storing and packaging automotive parts and accessories. The lease runs through 1951 and calls for rental of \$190,000 a year. The entire K-F parts operation will be moved to the Adrian plant.

#### King-Seeley Corp. Plans New \$500,000 Factory

King-Seeley Corp., manufacturer of automotive instruments, is planning to build a \$500,000 plant west of Ann Arbor, Mich. The die casting, governor assembly, chrome plating, and machine shop sections of the Ann Arbor plant will be transferred to the new unit which will contain 47,000 sq ft of floor space. It is expected to be completed by next fall.

(Turn to page 214, please)

Give Gladly
to the

RED CROSS
It's Ready to
Serve You

## RECESSED HEAD SCREWS

## ARE ENGINEERED FOR RACTICAL PRODUCTION DRIVING

#### RECESS EDGE ROUNDED AT TOP



d

16

n

Prevents pushing up burrs because contact with driver begins just below top surface of screw head. Easy for driver to "ride in" to a firm seat, without excess strain on driver point wings.

#### WIDER OPENING AT RECESS CENTER



Absence of sharp corners provides wider center opening. This recess shape aids selfcentering of driver. It also permits driving tool contour that insures maximum strength.

#### **RECESS WALLS** HAVE MINIMUM TAPER

Steep walls resist tendency of driver to ride or "cam" out of recess. Consequently, less end thrust is needed at any torque. Driver seats fast stays seated.

LOOK CLOSELY at the Phillips Recess. No sharp corners to burr easily - require slowed-down, fussy starting or to "beat up" bits.

Phillips Engineers shaped this recess according to job conditions, not on abstract theory. They know assembly workers are fast moving, often "heavyhanded," cannot always be as fully trained as desired.

That's why Phillips Recessed Head Screws not only promise, but deliver all advantages of the cross recessed head on any assembly job.

GET ALL THE ADVANTAGES OF ASSEMBLY

WITH CROSS RECESSED HEAD SCREWS...GET

GET THIS NEW BOOKLET to guide you in selecting the right cross recessed head screws for your assembly ... "Why Phillips is the STANDARD Cross Recessed Head Screw". It's free.

USE THE COUPON

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

seanourd Screw Lorg,
Shakeproof Inc. Hardware Mig. Co.
The Southington Hardware Mig. Co.
Sterling Bolt Co.
Stronghold Screw Products. Inc.
Wales Beech Corp.
Wolverine Bolt Company



Phillips Screw Mfrs., c/o Horton Noyes Co. 1800 Industrial Trust Bldg. Providence, R. I.

Send me the new booklet—"Why PHILLIPS is the STANDARD Cross Recessed Head Screw".

Name ..... 

March 15, 1948

#### **General News**

(Continued from page 212)

### Bell Steps Up Output Of Prime Mover

Several hundred orders have been received for Bell Aircraft Corp.'s motorized wheelbarrow, the Prime Mover, and production has been stepped up to ten a day. On April 1, the production rate is scheduled to go to 20 a day and thereafter, as fast as plant facilities can be set up, to 50 a day. The company has produced 250 prime movers.



This new four-passenger Aeronca Sedan, powered by a 45-hp Continental engine, is said to have a top speed of about 120 mph. Gross weight is 2050 lb; wing span, 37-5 ft.; height, seven ft.; and length, 25 ft., three in.



## Timken Leases Space in Zanesville, O.

The Timken Roller Bearing Co. has leased 50,000 sq ft of manufacturing space in Zanesville, O. from the Shawnee Pottery Co. in order to consolidate all of its Zanesville operations. Now divided among three plants, grinding, assembling, inspection, packing, and shipping of bearings and parts operations in Zanesville will be concentrated under one roof.

#### Make All Wheel Drive For 1948 Ford Models

An "All Wheel Drive" conversion for the new 1948 Ford models is now being produced by the Marmon-Herrington Co., Inc., Indianapolis, Ind. Driving power is transmitted to the front wheels as well as to the rear by this drive which, although emphasis is being placed on trucks, is applicable to all standard 1948 Ford models.

#### Ship 462 Personal Plants in January

Personal aircraft shipments by 13 manufacturers totaled 462 in January, the Aircraft Industries Association of America recently announced. With a total dollar value of \$1,897,000, figured at the manufacturers net billing price, the shipments included 211 four-place planes and 251 two and three-place planes.

## Deliver First 4-Jet B-45

The U. S. Air Force recently took delivery of its first operational all-jet bomber, the North American B-45. The first of over 100 to be built by North American Aviation for the USAF, the B-45 will be put into service this spring.

(Turn to page 218, please)

## TAILOR-MADE FOR YOUR DIESEL ENGINE



WAUKESHA

GMC

DIAMOND-T

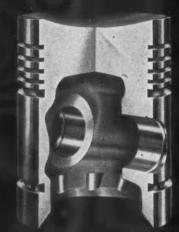
HERCULES ENGINES MACK

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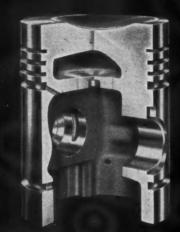
BUDA

HALL-SCOTT

#### PISTONS FOR EVERY PURPOSE



CONDUCTION COOLED



PRESSURE OIL COOLED



SERRATED FINISH

Any Engine is a Better Engine with Pistons Designed by Zollner

CONTINENTAL REO

STUDEBAKER CUMMINS

TWIN COACH

MARMON-HERRINGTON IHC

PISTON EQUIPMENT

ZOLLNER MACHINE WORKS . FT. WAYNE, INDIANA

# SUN "JOB PROVED" PRODUCTS CUT COSTS, SPEED PRODUCTION, IMPROVE QUALITY

Proof of the value of any industrial product lies in the experience that practical men have had with it. Sun products have been "Job Proved" in the lubrication of almost every type of mining, manufacturing, power and transportation equipment . . . in refrigeration and air-conditioning . . . in metal cutting, tempering and quenching . . . in the processing of textile fibers, leather, natural and synthetic rubbers . . . in the impregnation of electrical, electronic, and packaging materials of various kinds.

To help you find solutions to problems in any of these fields, Sun Oil Company offers a wide selection of "Job Proved" petroleum products, plus the experience of Sun Engineers. Their know-how and detailed product information are yours for the asking, without obligation. Telephone your local Sun office, or write Dept. AA-3

## SUN OIL COMPANY Philadelphia 3, Pa.

"JOB PROVED" PETROLEUM PRODUCTS FOR INDUSTRY

#### SUN INDUSTRIAL OILS

SOLNUS OILS — Well-refined straight mineral eils. Stand up under hard use for long periods of time. Recommended for use in the machine tool industry, in air compressors, certain types of Diesels, etc.

SUNVIS OILS — Are in the same category as Solnus Oils with the difference that, in addition, they meet practically all paraffinic and high V.I. oil specifications.

OCNUS OILS—Low carbon-content oils, containing an additive which minimizes oxidation and gives detergency, Ideal lubricants for internal combustion engines subjected to continuous heavy loads under the most adverse operating conditions.

**DYNAVIS OILS**—Low pour point inhibited oils which help prevent formation of harmful corrosive and sludge-forming acids. Well-suited for engines fitted with alloy bearings and operated at high temperatures.

SUNTAC OILS — 100% petroleum products which have been treated to increase their adhesiveness. Recommended for general lubrication in all industries where sudden shocks and reversal of loads take place. These oils cling to the parts to be lubricated.

CIRCO OILS—Used for general lubrication of industrial machinery when straight mineral oils are required.

SUNISO REFRIGERATION OILS—Have extremely low pour points and long life stability characteristics. Initially neutral and resistant to formation of detrimental acids under service conditions. The most outstanding oils in the refrigerating and air-conditioning fields. STEAM CYLINDER OILS—High flash and fire point lubricants for either saturated or super-heated steam conditions and for worm gear speed reduction units.

SUN CAR JOURNAL OILS—Dark oils meeting A.A.R. Specifications. For use on railroad cars and waste-packed bearings of railroad equipment.

SUN DELAWARE OILS — Dark oils for general lubrication on older type industrial machinery.

SUNOCO WAY LUBRICANT—Has good metal-wetting and adhesive properties, ample viscosity and E.P. qualities. For use on tableways, as it eliminates chatter and scoring . . . resists corrosion.

SUN MARINE ENGINE OILS—Compounded with special emulsifying agents in order to provide adhesion to and lubrication of working parts in the presence of water. For the lubrication of béarings, eccentrics, cross-heads and various other parts of steam engines.

ROCK DRILL OIL—Heavy-duty adhesive type oil. For use in jack-hammers, stopers and drifters on heavy-duty mining operations.

SUNVIS 900 SERIES TURBINE OILS—High V.I., predominantly paraffinic oils, of uniform 0°F. pour points, containing additives to give high oxidation stability and corrosion resistance under practical operating conditions. Modern oils for turbine and hydraulic systems.

## SUN INDUSTRIAL GREASES

SUN CUP GREASES—Water resistant. For grease cup and grease gun application when the service is not severe.

SUN GUN GREASES — Smooth greases made with medium viscosity oil. Stable under pressure in power guns or booster guns.

ADHESIVE PRESSURE GREASES—Won't drip or splash and are excellent lubricants for open gear applications.

SUN DARK PRESSURE-SYSTEM GREASES — For power-driven central grease lubricating systems in heavy industries. Can also be used as a "medium cup grease."

SUN MINE CAR GREASES—Available in several grades. Suitable for both anti-friction bearings and plain bearing cavity-type wheels.

SUN ROLLER BEARING GREASES—For use on electric motors and generators and other high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS—Black adhesive open gear compounds and wire cable greases. Recommended for open gears on metalworking power presses, mining machinery, old reduction mills, crushers, pump gears, etc.

SUN MINING MACHINE LUBRICANT—Semifluid. For use where a light but adhesive type grease is required. Free from separation or decomposition.

SUNOCO TRACTOR ROLLER COMPOUND— For miscellaneous parts of caterpillar or crawler-type tracks. Provides good lubrication with exceptional sealing qualities.

## SUN METALWORKING

SUNICUT — Straight or non-emulsifiable transparent cutting oils. Recommended for automatic screw machines and for heavy-duty machining operations.

SUN INDUSTRIAL



SUNOCO EMULSIFYING CUTTING OIL—A self-emulsifying oil which produces a stable white emulsion when mixed with water. Sunoco is an efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and non-ferrous metals. It is also an excellent grinding coolant.

**SUN QUENCHING OILS**—Specially refined oils designed to develop maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel up to 550°F. Due to their low carbon content and stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum and brass.

SUN ANTI-RUST COMPOUNDS — Petroleum base oils with chemical additives designed to prevent the rusting and corrosion of steel.

#### SUN PROCESSING OILS

SUNOTEX TEXTILE OILS—Designed to impart certain additional properties to various forms of fibers during their processing from the fiber state into a manufactured product. All Sunotex textile oils are emulsifiable in water.

SUN COTTON CONDITIONING OILS—Pale mineral oils which condition the cotton. They prevent waste by cutting down excessive amounts of "fly" or fine air-borne particles of lint.

SUN ASBESTOS FIBER CONDITIONING OIL—Used for spraying on the asbestos during processing. Fibers are not so readily damaged or broken down into harmful dust when this product is used.

SUN CORDAGE OILS — Are adaptable in various formulae used by cordage manufacturers. They are selected products which are highly compatible with additives.

CIRCOSOL—2XH (Rubber Processing) —
An elasticator and processing aid for GR-S
particularly.

CIRCO LIGHT PROCESS OIL (Rubber Processing) —A processing aid and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber particularly. Used for GR-S to some extent.

SUNDEX 53 (Rubber Processing)—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established outstanding processing aid for footwear rubber stocks.

CIRCOMAR-5AA (Rubber Processing)—A black colored product used in reclaiming natural rubber scrap. Used also as substitute for asphalt fluxes in processing natural and GR-S rubber. Free-flowing at room temperature.

SUN LEATHER OILS—Mineral base leather oils. Used for obtaining the desired tensile strength, proper temper and a controlled moisture content. They maintain a light even color . . . mix well . . . distribute evenly.

## SUN MISCELLANEOUS INDUSTRIAL PRODUCTS

SUN SPIRITS — For the thinning of paints, varnishes, and enamels. Also for metal cleaning. This product is a pure water-white petroleum solvent and is free of corrosive sulphur.

SUN WAXES — Used in packaging, sealing, coating, waterproofing and for numerous manufacturing and chemical processes.





#### THIS MAN DOES NOT OIL HIS MACHINE . . .

because he's too busy bending tubing into complicated shapes...he's too busy getting out a full day's production...in short, he's just too busy to bother with the details of lubrication...

#### YET THE MACHINE KEEPS RUNNING SMOOTHLY . . .

because it's a Bijur-oiled machine which oils itself while running...it assures the correct oil-film to each individual bearing automatically...it eliminates the human element from the oiling routine...

WHY . . .

because built into the machine is a cyclic lubricator (1) which periodically discharges a measured quantity of filtered oil...a single line of branched tubing (2) instantly delivers the oil to the bearings...a meter-unit (3) at each bearing apportions the correct oil-film to the bearing surface automatically.

For further information, write for "The Travels of Modern Lubrication."

#### BIJUR LUBRICATING CORPORATION

43-13 22nd Street . Long Island City 1 . New York

## General News

(Continued from page 214)

#### Normal Depreciation Is Inadequate

companies through Automobile their annual reports to stockholders, and through public relations programs are increasingly emphasizing extremely high replacement costs of plants and equipment in relation to normal reserves set up for that purpose. K. T. Keller, president, Chrysler Corp., points out in his annual report that high replacement cost is a very difficult long term financial problem for all industry. He said the original cost of all buildings, machinery and equipment now owned and used by Chrysler was more than \$210 million. Replacement at today's price, however, would cost \$352 million, against which depreciation reserves of \$130.5 million have been accumulated to date. He said further that if present prices continue or rise the only way the replacement problem can be met ultimately without resorting at some future time to capital financing would be by accumulating cash balances from current operations.

Accordingly, Chrysler is currently modifying its depreciation policies by accelerating charges for the early years of productive use of facilities acquired since the war, amortizing on a short time basis the excess cost of such acquisitions over prewar price levels. As a result depreciation charges against 1947 earnings have been increased by more than \$5 million to a total for the year of more than \$13.5 million.

#### Ford To Up Size of Plant In Mexico City

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In order to increase output and storage space, the Ford Motor Co. will boost the size of its assembly plant in Mexico City this year from 240,000 sq ft to 440,000 sq ft. A total of \$500,000 worth of new equipment will also be imported from the U. S. by Ford for the production of the 1949 models.

(Turn to page 220, please)

# AUTOMOTIVE INDUSTRIES Presents THE NEWS



The many advantages of custom-made machine tools in improving operator productivity and lowering cost per piece are well illustrated by this new machine. Before designing such machines, Cross evaluates all factors which influence individual manufacturing—quality, quantity, operation sequence, and operator limitations. The result is a special machine tool capable of producing specific products at the lowest possible cost.

The machine illustrated above is typical of this planning.

PART: Automobile Rear Axle Differential Carrier.

OPERATION: Drill, countersink, ream 10 flange holes. Drill, countersink, tap 4 bearing cap holes. Drill, tap drain hole.

PRODUCTION: 150 pieces per hour at 80% efficiency.

EQUIPMENT: Cross Special Drilling and Tapping Machine.

FEATURES: 

Minimum physical and mental effort required from operator 
Part slides in and out of machine on rails—no lifting required 
Seven-station power operated index table 
Independent loading station 
for pieces cut at a time progressively 
Flexibility for part design changes through use of Cross standard columns, heads, and index table 
Hardened and ground steel ways 
Hydraulic feed for drilling, reaming, and countersinking 
Lead screw feed for tapping.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE CROSS COMPANY

SPECIAL MACHINE TOOLS

MILLING . DRILLING . TAPPING . BORING . TURNING . SHAPING . GRINDING . HONING

DETROIT 7, MICHIGAN

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#### **General News**

(Continued from page 218)

#### Name T. H. MacDonald As Beecroft Lecturer

For substantial contributions to the safety of traffic involving the use of motor vehicles, Thomas H. MacDonald, Commissioner of the U. S. Public Roads Adiministration, has been named the Second Annual David Beecroft Memorial Lecturer by the SAE.



U. S. Navy Photo from Acme

#### AERIAL SPLIT

Featuring a "split canopy" for special operations the doors and upper half of the cockpit covering of this new model Bell HTL-2 helicopter are removable. Powered by a 178-hp engine, it has a cruising speed of 85 mph, a service ceiling of 11.500 °ft, and can carry a useful load of over 700 lb.

## Send Technical Magazines to Veterans' Hospitals

A strong need has been expressed by veterans in veterans' hospitals for magazines of a technical nature, particularly the journals of the various societies covering engineering, economics, political science, physics, chemistry, factory management, and so forth. Magazines should be sent to local veterans' hospitals.

#### Drover, Australian Transport, Makes First Flight

In Sydney, New South Wales, Australia, the first aircraft to have been wholly designed and built by the Australian de Havilland Co., the Drover light transport, a metal monoplane powered by three, 140-hp Gipsy Major engines, recently made its first flight. It will be normally arranged to seat six passengers, and is capable of carrying a payload of more than half a ton at about 135 mph for a range of about 500 mi.

The Drover has been designed to meet Australian conditions, and in particular to replace Dragon biplanes of 1932 design which were built in Australia for war training and have since been used for commercial work in the country districts. Simplicity is therefore the keynote of the new design. It has a non-retractable undercarriage with oversize wheels and tires for use on rough airfields; its engines are the simplest version of the Gipsy range (made in England); and drive controllable pitch propellers of the Havilland type.

(Turn to page 222, please)



HYDRAULIC PRESSES AND VALVES FOR ENCET PURPOSE - ACCOMPLATORS - ACCOMPLATORS - INTENSIFIERS

R.D. Wood Company

COINING

Building, Independence Square,

Philadelphia 5, Pa.

March

# Which is really Betty Hutton?









## JTO-LITE SPARK PLUGS

are "Ignition Engineered"

Since most spark plugs look alike, it's hard to tell which is best from outside appearance—just as it's difficult to tell which of the pictures above is really Betty Hutton. To make sure you get the best, ask for Auto-Lite Spark Plugsthey're ignition engineered. This means they're designed by the same engi-

neers who design the entire electrical life-line for many of America's finest cars—from battery to coil to distributor to spark plug. Score yourself 100% if you picked the girl at the left as the real Betty Hutton, beautiful and talented actress soon to be seen in Paramount's thrilling new hit "Dream Girl." At right is Miss Chris Holly of East 65th St., New York City, who looks so much like Miss Hutton that crowds often gather when she goes out shopping.

You'll be 100% right, too, if you switch to Auto-Lite Spark Plugs, equipment on many leading makes of cars.

THE ELECTRIC AUTO-LITE COMPANY

MONEY CANNOT BUY

A BETTER SPARK PLUE

Listen to Auto-Lite's radio program, YOUR THURSDAY NIGHT MEETING starring Dick Haymes, Gordon Jenkins' Orchestra, Thursday 9:00 P. M., E.T. CBS.

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# ATTWOOD BRASS PRODUCTS

Transportation is on the move — keeping up with the increased demands of a vehicle-riding public.

Attwood Brass is also on the move — busily supplying every type of transportation equipment with permanent, lustrous brass hardware and fittings — leading the way in developing important safety and comfort features of quality automotive trim.

Because of Attwood's improved and expanded production facilities—ready fabricated parts — styled for tomorrow— are being used on the automobiles, buses, trucks and commercial cars of today.



The new Attwood Automotive Catalog No. 25 will be ready for distribution in the near future. Write for your copy now — complete with descriptions and specifications — we'll send it to you at the earliest possible date.



Write to 850 Front Ave., N.W., Grand Rapids 4, Michigan

## General News

(Continued from page 220)

#### Cornell Lab. to Operate Giant Wind Tunnel

Cornell Aeronautical Laboratory's mammoth wind tunnel is scheduled for full-scale operation this month, it was disclosed recently with the announcement that Cornell has received gifts totalling \$105,000 from five aircraft manufacturing firms to finance the final stages of calibration of the Buffalo project. The contributions have come from United Aircraft Corp., Grumman Aircraft Engineering Corp., Fairchild Engine & Airplane Corp., Bell Aircraft Corp., and the AVCO Manufacturing Corp. The companies were among the seven from the aviation industry which provided \$675,000 as working capital after the aeronautical laboratory had been presented to the university by Curtiss-Wright Corp. in 1946. Occupying an entire wing of the Buffalo laboratory, the great steel tube has an overall length of 178 ft and a width of 81 ft.

#### British Austin Sets Up Parts Div. in N.Y.C.

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As part of a campaign to guarantee owners of its new 1948 models that replacement parts will be readily available, The Austin Motor Co., Ltd., (England) has established in New York City a Central Parts Div. under the direction of Eric Sadler, general service manager.

#### Towmotor Opens Service Shop In New York City

New York City became one of a relatively few areas in the country to boast of a modern, fully-equipped service shop devoted exclusively to the maintenance and repair of fork lift trucks, industrial tractors and fork lift truck accessories when Townotor Corp., Cleveland, O., recently announced the opening of its new service and repair shop.

#### Navy Contract Ups McConnell Backlog to \$40 Million

The McDonnell Aircraft Corp., St. Louis, has received a new Navy contract covering production of additional F2H-1 Banshees, as well as the fabrication of spare parts and ground handling equipment, making the new backlog figure well over \$40 million. Proposed Banshee production schedules will push employment figures to almost 6000 by the spring of 1949. The addition of an estimated 2600 workers will surpass previous wartime employment figures for McDonnell's operation in St. Louis and Memphis combined.

(Turn to page 224, please)

# The uses of LOK-THRED"

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RIES

STUDS, BOLTS OR SCREWS
LOCK MORE SECURELY...BECOME
TIGHTER IN SERVICE...FORM
A SEAL THAT LIQUIDS UNDER
PRESSURE CANNOT PENETRATE

The revolutionary "LOK-THRED" that has proved so successful in stud applications can now be made in any type of threaded fastener.

Now the uses of "LOK-THRED" are unlimited. Whether you need a tiny screw or a heavy-duty bolt, you can have the headed fastener you want—threaded with "LOK-THRED".

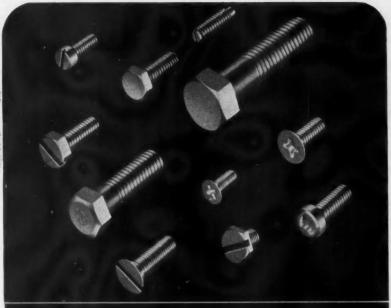
With the positive sealing action of "LOK-THRED", bosses and blind tapping can be eliminated in many

cases. Air and liquids are held under pressure without leakage—suggesting many new uses, such as for water pumps or for cylinder heads.

Write for "LOK-THRED" booklet, today.









#### Look at all these Advantages

- Lock securely and become tighter in service.
- 2. Have much higher fatigue limits than studs with conventional threads.
- 3. Stronger in both tension and torsion than ordinary American National Threads.
- Carry entire normal working load on 6° angle at root of thread under high compressive prestress.
- Modified American National Threads permit use of standard tools.
- Re-usable and on any reapplication less than one-half additional turn brings torque back to its original installation value.
- 7. Do not require selective fits.
- Do not gall when being driven or fret in service.
- 9. Act as dowels and taper pins.
- Seal positively and eliminate added bosses and blind tapping.

THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO



#### NORWEGIAN NEWCOMER

Delivered to the Anglo-Iranian Oil Co., Oslo, Norway, this tractor-trailer unit is reportedly the largest in Scandinavia. The unit consists of a Mack LJSW tractor, equipped with Cummins NHB Diesel engine developing 200 hp at 2000 rpm, a 5250-gal Fruehauf semi-trailer, and a 2500-gal Fruehauf four-wheel trailer.



## Precision-Made

## GREASE FITTINGS

for Original Equipment

Get the right grease fittings for every lubrication point—specify ARO! They're accurate . . . rugged . . . dependable!

Aro Grease Fittings are new in design. The lower half of head is machined to a perfect spherical shape so that coupler jaws insure a tight, leak-proof seal. Upper half of fitting head is machined concave to permit an easy disconnect of coupler jaws—resulting in less wear on jaws and fittings. Made of specially hardened steel with machine-cut threads for accuracy. Complete range of types and sizes. Write for details. The Aro Equipment Corporation, Bryan, Ohio.



LUBE EQUIPMENT AND AIR TOOLS FOR AUTOMOTIVE SERVICE... INDUSTRY...FARM

#### **General News**

(Continued from page 222)

#### **Obituary**

#### George H. Buzby

George H. Buzby, 85, a founder and retired vice-president of the original Chilton Co. died Feb. 27 in Philadelphia. Mr. Buzby together with C. A. Musselman and James Artman first published the Cycle Trade Journal in 1896, later the Automobile Trade Journal in 1899.

#### Harold E. Long

Harold E. Long, 61, manager, Nash-Kelvinator Corp.'s Nash Motors Div. plant at Kenosha, Wisc. died suddenly on Feb. 28 in Kenosha.

#### Carlos H. Allen

Carlos H. Allen, 56, dean of bearing application engineers specializing in automotive design, and for 29 years in the Detroit Office of the New Departure Div. of General Motors Corp. died on Feb. 8.

#### Patrick J. Flaherty

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Patrick Flaherty, 69, chairman of the board of directors, Johnson Bronze Co., New Castle, Pa. died suddenly on Feb. 12 in Miami Beach, Fla.

#### Joseph G. Gagnon

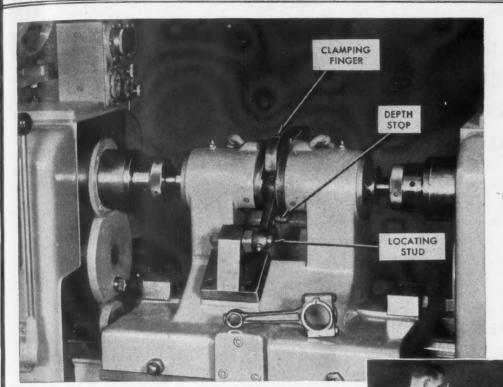
Joseph G. Gagnon, 59, chief metallurgist, Hudson Motor Car Co., died recently.

#### Millard F. Shryer

Millard F. Shryer, national field representative, Motor and Equipment Wholesalers Association, died on Jan. 25 in St. Louis, Mo.

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



Model "CS"

So-SWING

Automatic Drilling
and

Centering Machine
Cuts Costs on
Chamfering
Connecting Rod
Main Bearings

Problem: To automatically chamfer both sides of connecting rod main bearings. Chamfer must be smooth and free from chatter marks.

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Solution: The Model "CS" Lo-swing Automatic Drilling and Centering Machine selected for this job, is equipped with one fixed and one adjustable drilling and centering head and a special automatically-operated holding fixture. The holding fixture, shown in the close-up illustration is fitted with a locating stud which holds and locates the connecting rod on the wrist pin hole. After mounting the part on this stud, it is necessary only to swing the large end of the connecting rod between two hardened steel bushings which hold the rod endwise, and a depth stop positions the hole axially with the chamfering cutters.

The air-operated clamping finger, shown just above the connecting rod, is automatically operated through an air valve controlled from the feed mechanism and is automatically closed when the machine is started and automatically opened at the end of the machine cycle.

The machine cycle is entirely automatic; the operator simply loads the parts and pushes the starting lever which also actuates the clamp. The chamfering cutters advance in rapid traverse to the cutting position, slow down for feed and then return in rapid

traverse to the starting position, where the clamp is automatically opened.

Principal production advantages are:

- 1st. Operator cannot forget to clamp the work as it is automatically clamped.
- 2nd. Operator is free to run other machines due to the rapidity of loading and unloading.
- 3rd. Amount of chamfer is constant. Stroke controlled by positive path cams.
- 4th. Production on an average size connecting rod is 300 pieces per hour!!!

PRODUCTION COSTS ARE LOWER WITH So-swing

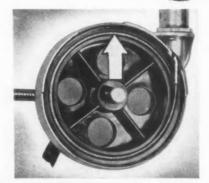
## CALLING ALL DESIGNERS OF AUTOMOTIVE ACCESSORIES

There's a message of interest to you in this telescoping radio antenna. It's in the S.S. White flexible shaft control. A glance at the illustration makes clear the advantages of this control. It permits both the antenna unit and the control knob to be mounted wherever desired. An S.S. White shaft, casing and fittings combination, made up to your torque and length requirements, will give you this same freedom of placement on any accessory that calls for control. And in every case, smooth, easy operation is assured because S.S. White remote control shafts are made specifically for this service.





As the reel is turned by the remote control shaft, another S.S. White shaft, operating "push-pull," extends and retracts the antenna sections.



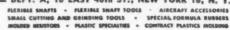
## GET FULL DETAILS IN THIS 260-PAGE FLEXIBLE SHAFT HANDBOOK

It gives full engineering information and data about flexible shafts and explains how to select and apply them for specific purposes. Copy sent free if you write for it on your business letterhead and mention your position.



S.S.WHITE
THE S. S. WHITE DENTAL MFG. CO. INC.

G. CO. NUUS IKAL DIVISION
DEPT. A; 10 EAST 40th ST., NEW YORK 16, N. Y.



One of America's AAAA Industrial Enterprises

PACIFIC COAST REPRESENTATIVE—F. W. STEWART MFG. CORP. 431 VENICE BLVD., LOS ANGELES 15, CALIF.

#### Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Moderate increases in general business activity are indicated. The New York Times index for the week ended Feb. 21 stands at 150.3, as against 149.7 for the preceding week and 146.2 a year ago.

Sales of department stores during the week ended Feb. 21, as reported by the Federal Reserve Board, equaled 249 per cent of the 1935-39 average, as compared with 238 in the week before. Sales were 15 per cent above the corresponding distribution a year earlier, as against a preceding year-to-year decline of three per cent. The total in 1948 so far reported is six per cent greater than the comparable sum in 1947.

Electric power production declined in the week ended Feb. 21. The output was ten per cent above the corresponding amount in 1947, as compared with a similar advance of 12.7 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 805,376 cars, 9.7 per cent more than the figure for the week before and 3.7 per cent above the corresponding number recorded in 1947.

Crude oil production in the week ended Feb. 21 averaged 5,342,325 barrels daily, or 4850 barrels less than the preceding average but 556,175 barrels above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended Feb. 21 is estimated at 12,840,000 net tons, 14.3 per cent more than the output in the week before. The total production in 1948 so far reported is 8,220,000 tons below the corresponding quantity in 1947.

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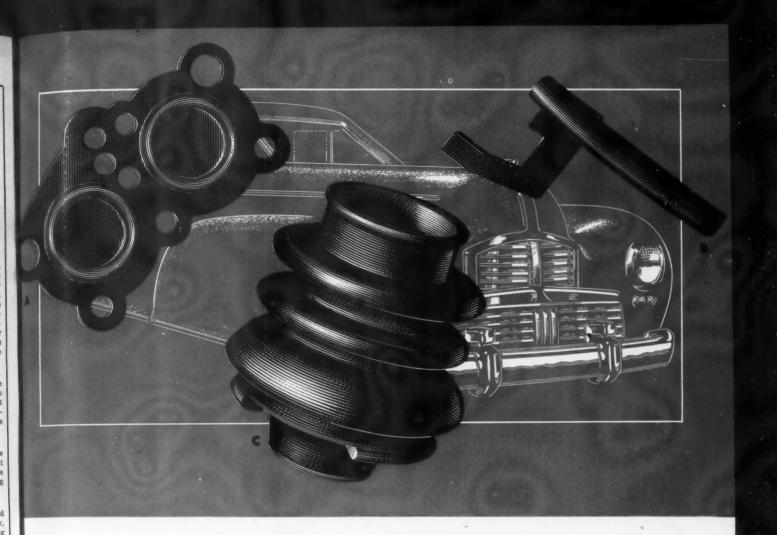
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Civil engineering construction volume reported for the four-day week ended Feb. 26, according to Engineering News-Record, is \$128,741,000, or 45 per cent more than the preceding weekly figure, for a five-day period, and 40 per cent above the comparable sum in 1947. The total recorded for nine weeks of this year is 16 per cent more than the corresponding amount in 1947. Private construction in 15 per cent below that a year ago, but public construction has increased by 73 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Feb. 21 is 159.2 per cent of the 1926 average, as compared with 159.7 for the preceding week and 144.3 a year ago.

Member bank reserve balances increased \$49 million during the week ended Feb. 25. Underlying changes thus reflected include a decline of \$75 million in Reserve bank credit and a reduction of \$69 million in Treasury deposits with Federal Reserve banks, accompanied by an increase of \$1 million in money in circulation.

Total loans and investments of reporting member banks declined \$133 million during the week ended Feb. 18. A reduction of \$69 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$14,623 million, shows a net increase of \$2866 million in 12 months.



#### OW SIRVENE SERVES IN THE

# Automotive Industry

A" is a carburetor diaphragm of complicated design;
B" is a specially developed seal for wheel bearings;
d "C" is a boot which protects a universal joint.
They represent just three of many hundreds of ways which Sirvene serves the automotive and aviation dustries.

Each is vastly different. Not only in design, but basic structure. Just as all Sirvene parts are differt. In cars, trucks, buses and aircraft made by lead-manufacturers, these Sirvene parts are meeting the quirements of endlessly different operating conditions. In each application, Chicago Rawhide engineers velop the design to meet the need; create a special mula for the compounded elastomer that will with-

stand the particular conditions of operation (temperature extremes, pressures, flexibility, resistance to oils, chemicals or other solvents) and precision-mold the part so that it delivers dependable performance.

You'll find Sirvene serving wherever the going is tough. Sirvene can serve you, too.

At your service —Sirvene engineers' vast experience and resources, for the solution of your most intricate pliable parts problems.

#### CHICAGO RAWHIDE MANUFACTURING CO.

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Sirvene products include diaphragms, boots, gaskets, oil seals, washers, packings, and other special molded mechanical pliables

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#### **AIRBRIEFS**

#### By Robert McLarren ORVILLE WRIGHT INVENTOR

Throughout the latter years of his life Orville Wright religiously reported to his "laboratory" every morning and returned home in the evening and refused comment on any of the sometimes fantastic "reports" of his activities while there. His executors, both nephews, have revealed that Orville continued his inventive activities up until the day of his death last January. Among his inventions are an automatic phonograph record changer and player "unlike anything yet on the market." Another device representing years of labor is an automatic decoding machine capable of handling one million different combinations of ciphers automatically. Other devices include several automatic stabilizing systems for aircraft in which he held a lifetime interest and numerous designs, models and systems for gliders, in which he never lost primary interest since his first flights in 1901-2 in gliders at Kitty Hawk, N. C. More prosaic activities in his laboratory comprise such "puttering" as furniture making and repairing and extensive woodworking.

#### MILITARY HELICOPTERS GROW

While the commercial growth of the helicopter appears painfully slow to its proponents, the military helicopter has gained a substantial role in the military field. The Air Force now is operating 126 helicopters, easily the largest helicopter fleet in the world. New Navy contract for 46 Sikorsky HO3S models will bring to 88 the total in service by the Navy. The new models contain provisions for flotation gear, rescue hoists for life saving and extra fuel tanks for increased range. Rotor diameter is 48 ft and the new craft is powered by a Pratt & Whitney Wasp Junior of 450 hp. Craft climbs 1200 fpm and cruises at 85 mph. Latest Navy Bell model is the HTL-2 which features a split canopy permitting either open or closed cabin for a variety of training missions.

#### AF-AMA PLANNING

With completion of the initial phase of the Air Force's aircraft manufacturing industry industrial mobilization planning program nearing, USAF has begun conferences with Automobile Manufacturers Association executives preliminary to launching the second phase of the broad program. The current aircraft industry planning studies are designed to report ways and means in which individual companies could expand production of current and projected models in the event of an emergency, including the needs from subcontractors, employment, raw materials, etc. The extent of the participation of the automobile industry in the USAF program will hinge on the extent to which the aircraft industry falls short of the anticipated production needs in an emergency to be made up by the automobile industry. The approach to the two industries has been different; the aircraft industry problem has been to determine the requirements for expansion of present production, whereas the automobile industry has been asked what it could do in an emergency. AMA has stated, in essence, "Tell us your requirements and we will tell you what we'll have to do to meet them." However, the Air Force has been unable to supply these requirements until the aircraft industry phase one studies have been completed, about June of this year.

#### FREE ENTERPRISE LESSON

A portent of what could happen here is seen in the British new transport situation created by governplanning. ment-controlled Overseas Airways Co., governmentowned airline, ordered postwar Avro Tudor transports two years ago, but delivery has been delayed. Avro charged BOAC with "stalling" by ordering excessive detail changes in the airplane, then buying U.S. aircraft. BOAC charged Avro with unexcusable delays in delivery forcing the U.S. purchases. A special government committee was called in to solve the dilemma, agreed with both parties and approved the U.S. transport purchases. After long delay BOAC will soon be flying Avro Tudor I transports over its England-Middle East-India routes and possibly to Australia. It will, however, continue to use Lockheed Constellations and, beginning this fall, Boeing Stratocruiser transports over its trans-Atlantic routes. Meanwhile BOAC and British



Follow the leaders of industry and replace slow, inaccurate, costly methods with the Centerless Lapping Machine.

With this Centerless Lapping Machine you obtain, without special operating skill, precision finishes of less than 2 micro inches on such materials as steel, glass, carbide, norbide and sapphire. No costly set-ups or special tools. Handles diameters .01 to 10.00". Automatic feed attachment availYou'll find this unit ideal for lapping oversize bearings, lapping and sizing bearing races, bushings, shafts and cylinders; for lapping oversize gages; for salvaging worn gages by lapping to the next lower size. Send for Catalog 47.

Size Control Reversible "Go" and "No-Go" Plug

Gages give 6 times service life.

MAKERS OF PLAIN, THREADED, AND TWIN PLUG GAGES . . . THREAD RINGS, SNAPS THREAD, GEAR, AND SPLINE WIRES . . . PIN AND DRILL GAGE SETS, FRACTIONAL SETS 2536 W. Washington Blvd., Chicago 12, Ill. Phone: Monroe 6710

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European Airways report a \$40,000,-000 deficit for their first operating year. But we are still told that the "planned economy" is a money-saver!

#### CONVAIR LINER APPROVED

The Convair Liner has received its Approved Type Certificate from the Civil Aeronautics Administration ending nearly a year of company and CAA tests. The new transport may now be delivered to customers for scheduled airline operation. Gross weight is 39,500 lb, at which weight the craft has a 1090 mile range at 16.000 ft with 5450 lb payload. CARdefined runway length is 3960 ft for both takeoff and landing. The currently certified version is powered by two Pratt & Whitney R-2800 war surplus engines supplied by American Airlines. These 1975 hp engines will be replaced at the first overhaul period with R-2800-CA-15 engines developing 2100 hp. Convair now has orders for 178 Convair Liners from both U.S. and foreign airlines as well several executive purchasers.

#### METAL ROTORS

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Goodyear Aircraft Corp. has delivered two sets of stainless steel rotor blades to the Air Force for tests on a Sikorsky R-5 helicopter. The blades are impervious to heavy rains and leading edge anti-icing equipment eliminates the icing danger. Fabric covered blades have been used in the past due to their lighter weight, flexibility and low frequency of vibration. However, the new metal blades are expected to be developed to a point where they compete on a weight basis, where any desired degree of flexibility can be obtained and where the vibration frequency is high enough to be beyond the frequencies developed by the engine. One of the important promises of metal blades is drag reduction through smoothness of the airfoil section. This will permit a substantial reduction in the power required, one of the major helicopter problems. Metal blades are already a standard feature on the Sikorsky S-51 commercial model.

#### FLYING POWER PLANT

A significant signpost to the future is the electrical system on the Douglas DC-6 which generates the astonishing power of 33,600 watts, larger by far than most of the commercial radio broadcasting stations in the nation. This power has increased from 2800 watts in the DC-3 through 11,-200 watts in the DC-4 and is indicative of the increasing reliance of large aircraft on electrical operation of equipment. The total weight of wire and terminals in the DC-6 is 683 lb including a liberal use (153 lb) of lightweight aluminum wire in the larger sizes. Complexity of the system (24-28 volt d.c. and 400-cycle, 115-volt a.c.) is seen in the use of 160 circuit breakers and ten fuses varying in rating from 3 to 600 amp.

#### PLASTIC WINGS

Wartime experience with glass laminate plastic aircraft wings and fuse-lages by the Air Force indicated that the weight problem of such materials has not been licked with the plastic versions weighing more than the original metal design. However, Wright Field is developing such materials for an entirely different reason now: their non-magnetic qualities. Because highspeed aircraft will not permit the

use of conventional antenna masts and wires, such equipment will have to be carried internally, which pre-sents problems. Radar equipment particularly will have to have fairly wide angles of nonmagnetic clearance for maximum effectiveness. To answer these problems, the Air Force is developing a special wing section for a Douglas C-54 electronics research plane. The glass fiber will comprise the skin of the panel in which a variety of radar and communication equipment will be mounted for test. Wartime tests proved that glass fiber core sandwish materials can be fabricated with adequate strength for wing and fuselage.

PUNCH 50000 PRESS

THE VERSATILE 38-TON PRESS FOR

- PRODUCTION
- TOOL ROOM
- TEST RUNS

You get much in addition to economical production from this new, open back, inclinable punch press. Use No. 38X in your tool room for shearing-in dies and punches. Use it for die tryouts in place of a screw press. This high speed punch press gives exact indication of results on the production run...shows up defects in material at once, where the slower screw press would yield a perfect sample.

Large shut height and bolster plate area make Walsh No. 38X ideal for many notching, forming and die-casting trimming operations. Die space 11" with a 4" stroke; bed area 18" by 26"; throat depth 12". Stroke up to 6" available in either flywheel or back-geared type. Variable speed or conventional motor drive.

No. 38X gives you all the standard design features that make Walsh presses strong, accurate, speedy, safe and economical. Write for full information.

#### Also New! WALSH 28A ARCH PRESS



A 28-ton capacity arch press especially suited for your die-casting trimming operations; plastic, rubber trimming work; and sheet metal fabrication. Flywheel, back geared, or with gearhead motor.

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It will pay you to consult your nearest Walsh Press Sales Engineer:

SCHULTZ & ANDERSON CO., Newark, N. J. • GIERSTON TOOL CO., Buffalo, Binghamton, Elmira, Jamestown, Syracuse, New York • KOREST-PETERSON CO., Detroit, Mich. • WM. W. COX, Camp Hill, Pa. • ARMIN H. WILLE & ASSOCIATES, Pittsburgh, Pa. • WM. MARSHALL, Minneapolis, Minn. • STAN SYBRANDT, Cleveland, Ohio • DICK GUIMONT, Indianapolis, Ind. • ALPHA CORPORATION, Greenwich, Conn. • BERNARD & CO., Robertson, Mo.



#### POSITIVE CONTROL OF EACH OPERATION

ANUFACTURERS throughout the country are saving time and money with the Profilometer on the job. Here is one of the "reasons why"—based on the fact that wherever successive operations are performed, the surface roughness produced by each operation vitally affects the next operation as to both the amount of material removed and the finish produced.

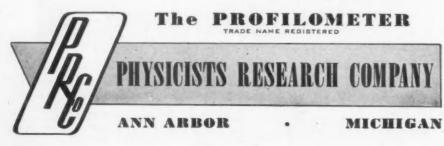
The Profilometer permits determining the microinch finish required from each operation to bring the parts most quickly and accurately to final size and finish. Once these roughness requirements are established, the same instrument permits positive control of each operation, right at the machine—with obvious savings all along the line.

Compare this control method with the older method of specifying only the operation (i.e., the machine, wheel or tool, speed, feed, etc.). A test in your own plant will show you that on any operation from cutting to polishing, the roughness will vary from 200% to 400% or more between identical machine set-ups, and from hour to hour on any one machine. With the positive-reading Profilometer at hand, your operators can catch these deviations at the start, and can maintain the required finish by making appropriate machine adjustments. This positive control gives greater production economy every time.

The Profilometer is very simple to operate. It is portable—can be used wherever most convenient. It is ruggedly built for shop use— gives definite, accurate microinch readings over long periods of time. And it is versatile—will measure practically any surface, external or internal, that can be produced by machining or grinding operations.

Write for full details on the above and other cost-saving applications . . . and arrange for a demonstration in your own plant.





## NEW PRODUCTS

(Continued from page 186

into the hydraulic brake fluid line leading from the master cylinder to the front wheels.

When slippery roads are encountered the unit is put into action by



Wagner hydraulic ratio changer

means of a control button mounted on the dashboard. The ratio changer then operates automatically to reduce braking input to the front brakes. This reduced braking prevents much of the tendency of front wheels to skid when the road is too slippery. With the front wheels rotating the driver can more easily keep his vehicle controlled.

#### K-52—Low Pressure Tire

A new, extra low-pressure tire, known as the "Mobil Air Cushion," which increases automobile safety and comfort, has been brought out by the Socony-Vacuum Oil Co., Inc., New York 4, N. Y. The "Mobil Air Cushion" requires only 24 lg of air pressure. In addition to easier car handling, it is claimed to provide better and safer steering.

The "Mobil Air Cushion" is designed for wide-base rims but can be installed on most conventional automobile rims.

#### K-53—Hydrogen-Free Coated Electrode

A new hydrogen-free, mineral type, extrusion coated electrode that is said to eliminate "underbead cracking" is available from Westinghouse Electric Corp., Pittsburgh 30, Pa. Ranging in diameters from ¼-in. to ½-in., these electrodes are recommended by Westinghouse for use with direct-current reverse polarity and also for alternating current.

Hydrogen occurring in welds can be very harmful under certain circumstances as it is taken into solution in molten steel and if substantial amounts of hydrogen, or gases containing hydrogen, are produced, substantial amounts can be absorbed in the weld.

(Turn to page 233, please)



## \*This Pair is prepared for "Better or Worse"

THESE are power take-off gears. Will they be called upon to idle along on easy jobs? Or will they be required to hit sustained top speeds under heavy gruelling loads? Who knows? With applications so varied in both industrial and agricultural fields they must be prepared for "better or worse"designed and built to standards that anticipate the hardest possible service.

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IN ALL LIKELIHOOD the gears you use are expected to bear unusual loads or stand up under adverse operating conditions. When you have established ultimate load capacity, either in your own plant or with the aid of our engineers, you get Double Diamond Gears that meet or exceed those specifications. And that goes for every other requirement as well-speed, service life, quietness, tolerances, and the rest. In brief, you get the only kind of gears we care to make-gears in every way worthy of the Double Diamond trade-mark.

Another point worth your consideration: We've been making "Double Diamonds" for more than twenty-five years. That's of great importance in a business where yesterday's experience so often solves tomorrow's problems. If we can serve you, write.

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Made by Automotive Gear Works, Inc. RICHMOND, INDIANA

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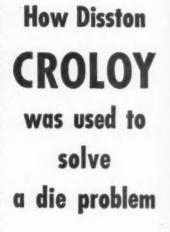


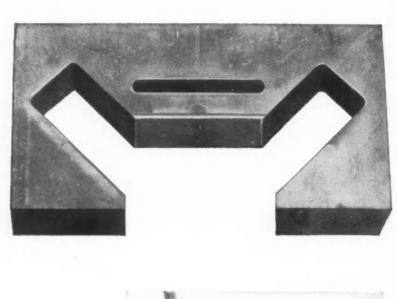




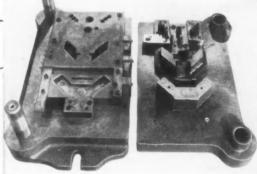


FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS









#### THE PROBLEM ...

A manufacturer had been experimenting with various alloys to find the one best suited for making the wing die shown above. Specifications called for a finished die of Rockwell C 59/61, without scale and with minimum distortion . . . dimensions had to be held within .002-inch, for no tolerance was allowed for finish grinding.

#### ANALYSIS:

CARBON 1.50% CHROMIUM 12.00% VANADIUM 1.00% MOLYBDENUM .80%

DISSTON METALLURGISTS AND ENGINEERS will be glad to help you with your tool steel problems...and without charge or obligation.

**STEEL:** Everybody who wants to obtain steel can help himself to get it by immediately starting scrap into the channels that serve steel mills

#### THE SOLUTION . . .

#### DISSTON CROLOY AIR HARDENING STEEL

This high quality, many purpose tool steel was designed to give high resistance to sliding and impinging wear, and at the same time combine air hardening properties with reasonable machinability. It has proved to be exceptionally serviceable for tools such as punches, dies, slitting cutters, gauges, brick liner plates, wearing parts and other applications.

HENRY DISSTON & SONS, INC., 331 Tacony, Philadelphia 35, Pa., U.S.A.

232

AUTOMOTIVE INDUSTRIES

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## NEW PRODUCTS

(Continued from page 230)

If the conditions are such that this hydrogen cannot escape before the metal solidifies, it will later be released when the metal cools and may cause underbead cracks.

Typical of the applications of this electrode are: Welding high carbon steels; welding high carbon to low alloy steel; welding low alloy steels; welding high sulphur bearing steels not heretofore weldable; welding mild steel structures that are to be vitreous enameled without previous heat treating; and for welding steel parts of unknown analysis.

#### K-54—Heavy-Duty Vehicle Brakes

Austin heavy-duty brakes, made by Austin Trailer Equipment Co., Muskegon, Mich., are adaptable to any suitable vehicle and existing brake actuating equipment. They permit the use of extra heavy ¾-in. lining.

No modification of existing truck axle housings or flanges is required to install the Austin brakes. According to the manufacturer, an adapter



Austin heavy duty brake

plate, easily drilled and bored to accommodate the axle flange and pilot, is adjustable to the brake anchor housing by means of screw threads. Thus the extra width of the heavyduty brake can be centered without alteration of axle housing length. A fillet weld insures permanent adjustment after the brake is fitted and installed.

#### K-55—Oxyacetylene Welding Torch

The Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y., has announced the immediate availability of a new oxyacetylene welding torch, the Airco 800. According to the manufacturer, this new torch has a number of distinct advantages. Although the new torch has a conventional weight of 1½ lb and is only 11½ in. long, it has a capacity for operating single flame welding tips from Nos. 0-13 inclusive as well as multiflame tips up to No. 15. This means that the new Airco 800 is suitable for almost any welding job from the thin-

nest sheet metal up to  $1\frac{1}{2}$  in. in thickness. The manufacturer states that no other comparable welding torch can offer this extremely wide operating range.

The torch head of the new Airco 800 is made of Monel metal. This means fewer torch head replacements and also lower maintenance costs because rarely, if ever, is reseating required.

In addition to the '800,' Airco is also offering a smaller version known as the Airco 700. This torch is constructed along the same lines as the larger '800' and offers the same advantages including the complete weld-

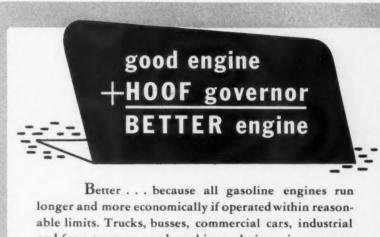
ing tip assemblies sizes 0-10 inclusive. The '700' also uses standard Airco Styles 98 and 188 welding tips in sizes 00-10 inclusive.

Cutting attachments that use Airco's present line of cutting tips are available for these new torches.

#### K-56—High Pressure Control Valve

Shafer Valve Co., Mansfield, Ohio, has brought out a high pressure control valve for handling air, water, oil, gas and steam. This electrically-con-

(Turn to page 234, please)



Better . . . because all gasoline engines run longer and more economically if operated within reasonable limits. Trucks, busses, commercial cars, industrial and farm tractors, road machinery, hoists, air compressors . . . just a few gasoline engine applications now using Hoof Governors for dependable speed control with no sacrifice of power.

Whether for a generator or a taxicab, each Hoof Governor is engine tested in our dynamometer laboratories . . . designed for each individual installation to provide full power, torque, and acceleration. Controlled engines save gas and oil, need fewer repairs and parts. Controlled engines are better engines.

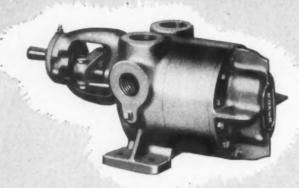
Write for New 1948 Catalog!



HOOF key and GOVERNORS

HOOF PRODUCTS CO., 6543 S. Laramie Ave., Chicago 38, Ill.

# Proved Roper Features that insure DEPENDABILITY



Hydraulic self-lubricating principle prolongs pump life with less service attention. There is positive continuous bearing lubrication. Liquid pumped enters grooved bearings from pressure side, is drawn to suction side through grooves in opposite bearings.

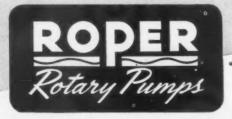
Floating equal size external gears, oversize bearings with gears supported at both ends, packed box or mechanical seal units to suit individual job requirements, efficient operation in either direction, easy accessibility to working parts cuts down "out-of-service" time.

Four-port design offering eight optional piping connections cuts installation time and cost. Four piping arrangements are possible with pump operating clockwise. . . 4 other arrangements with pump operating counter-clockwise.

#### WIDE RANGE OF SIZES

Capacities 3/4 to 300 g.p.m. — pressures up to 1000 p.s.i. — speeds up 1800 r.p.m.

Send for Bulletin of Facts Today



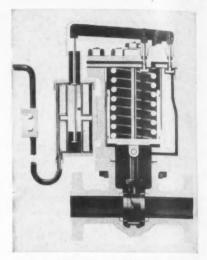
GEO. D. ROPER CORP., 603 Blackhawk Park Ave., Rockford, Ill.

## NEW PRODUCTS

(Continued from page 233)

trolled valve will operate at high  $_{
m 0r}$  low temperatures and at high or low opening and closing speeds.

No current is required to maintain the valve in either open or closed po-



Cut-away view of Shafer valve

sition. Contact of one switch for only a few seconds energizes the solenoid coil and opens the valve, contact of the other switch closes the valve.

Only three wires to the Shafer valve control and two control switches at the operating center are required to control the valve.

#### K-57—Aluminum Lock Washers

The George K. Garrett Co., 1421 Chestnut St., Philadelphia, Pa., has placed on the market an aluminum spring lock washer for use in all types of light metal assemblies. This new Diamond G aluminum spring lock washer is said to have all the advantages of the lightweight, corrosion resistance and other features of aluminum and, at the same time, to have the strength and spring tension of a bronze or stainless washer.

The new lock washer will be manufactured in all standard and special sizes as required by various industries utilizing light metal products.

## K-58—Fluid for Torque Converters

To meet the rapidly expanding use of torque converter drives in bus operation, Gulf Oil Corp., Pittsburgh 19, Pa., has developed a new torque converter fluid, characterized by high re-

(Turn to page 236, please)

OHRONZE SELETE SELECTION DE SEL

# A Complete Sleeve Bearing Service for the Automotive Industry

One of the chief reasons why so many leading manufacturers in the Automotive Industry depend on Johnson Bronze is the complete, understanding and cooperative bearing service we render them. Before new models are produced we help them determine which type bearing will render the best service. Then regardless of the type of bearing they require . . . cast bronze, babbitt-lined, sheet metal, steel and babbitt, aluminum or powder metallurgy . . . we produce their needs exactly to specifications and deliver the order on time. As we make all types of Sleeve Bearings, we base our recommendations on facts . . . free from prejudice. We have the complete facilities . . . the skilled help . . . and more than forty years exclusive bearing experience. Isn't this the kind of bearing service you can use to your advantage? It costs nothing to inquire.

JOHNSON BRONZE COMPANY
625 South Mill Street, New Castle, Pennsylvania

## For the ENGINEER

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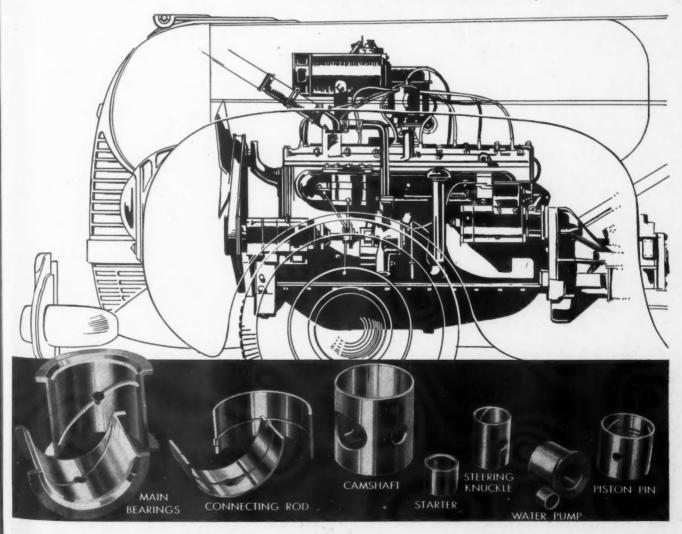
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RIES

File Folder contains complete data on all types of sleeve bearings. It's FREE.



#### NEW PRODUCTS

(Continued from page 234)

sistance to oxidation for prevention of deposits.

The new product, named Gulf Fluid-Torque Oil A, cushions converter seals against wear. It contains rust preventives which forestall rusting from moisture of condensation.

The new product is said to have a very high viscosity index to assure constant viscosity at operating ranges and minimize fluid friction. A low pour point of -25 F. has been maintained.

## K-59—Hastings Spark Plug

Pre-checking performance by X-ray is one of the features of the Hastings Aero-type spark plug, announced by the Hastings Manufacturing Co., Hastings, Mich.

In the X-ray test, each plug is

In the X-ray test, each plug is given a fluoroscopic examination to be certain the electrodes have been properly seated and sealed to provide a definite path for the heat to flow out. In addition, each plug is given a final electrical test of 60,000 volts.

Because of the ability of the Hastings plug to transfer more heat, it operates over a wider heat range, and with efficient ignition, according to the manufacturer. As a result, only fifteen Hastings plugs needed to give complete service for all passenger cars, trucks tractors and buses; also marine and industrial applications.

Hastings also presents a performance-rating system that is easy to understand. In the designation of type of plug, one number indicates the thread size in millimeters or fractions of an inch. A second number shows the amount of work the plug will do, with ratings indicating hotto-cold as the rating numbers increase.

#### Italian Car Output to Increase in '48

According to the latest official figures, the Italian automobile industry during 1947 produced 25,000 passenger cars, 5400 medium size trucks, 6500 heavy trucks, 2500 buses and 2000 various types of motor vehicles. For 1948 it would appear that, since the Italian Government is likely to remove restrictions on the use of passenger cars, there is the chance of an increase in the production of cars. However, Italian buyers do not seem to be inclined to pay 650,000 lire for a Fiat Topolino, as quoted recently by the Turin factory. On the other hand, many road transport concerns are emigrating from Italy to South America with their entire organizations. Under these circumstances it is not likely that Italian truck factories might increase their output during 1948, except for such special trucks as vehicles to carry perishable goods, tank trucks, etc., of which there is a certain shortage. However, Swiss interests are about to finance the construction of highways between Switzerland and Italian ports, which might create a demand for larger trucks than those used it present. The new highways are to measure 35 meters in width against the 15-meter highways now in use. Also of importance is the fact that Fiat of Turin has secured control of the O. M. in Breascia whose shops are to be used for mass production of 14-ton Diesel trucks in the various versions required at present on the Italian market.

Another interesting development in the Italian automobile industry is represented by the decision of the Italian Government to allow the temporary free import of foreign automobile frames into Italy to be completed with Italian structures. This is in consequence of the heavy demand received by Italian structure builders from foreign car factories after the success of the Milan Car Show last November. It looks as if Turin structure builders are about to sign a cooperation agreement with the Austin Co. and the Leyland Co. to complete cars, trucks and buses destined to Mediterranean markets.



To assure 100% grease free surfaces for subsequent finishes to automobile bodies, refrigerators, washing machines, toys and hundreds of other products, choose a Blakeslee Metal Parts Washer, especially adaptable to the cleaning of metal parts prior to surface treatment. Blakeslee sprays are designed to reach all surfaces and each machine is "tailor made" to do a specific cleaning job. From our experience in handling every metal piece from small watch parts to diesel engine crankcases, we have been able to build a washing machine designed to do a perfect job and to last for years.

Write for FREE booklet on Blakeslee Metal Parts Washers to answer your particular cleaning problems.

## G. S. BLAKESLEE & CO.

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS NEW YORK, N. Y. TORONTO, ONT. METAL PARTS WASHERS

BLACOSOLV DEGREASERS AND SOLVENT

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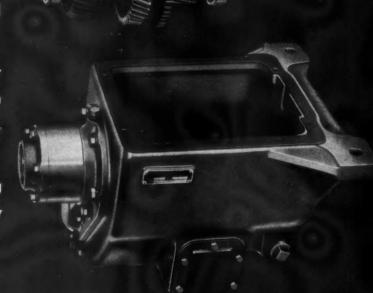
MOUNTAINOUS

# 21 AUXILIARY TRANSMISSIO improve truck operation on any terrain MULTIPLE-SPEED RANGE FOR HIGHER SPEEDS . BIGGER PAY LOADS . GREATER ECONOMY

Spicer Auxiliary Transmissions permit drivers to pick the right gear ratio under all conditions of pavement, traffic, grade, load and wind resistance.

There are three convenient Power Take-Off mounting positions on the Spicer Auxiliary Transmission, to meet various requirements.

Write for information regarding the adaptation of Spicer Auxiliary Transmissions to trucks.



SPICER MANUFACTURING • Division of Dana Corporation TOLEDO 1, OHIO

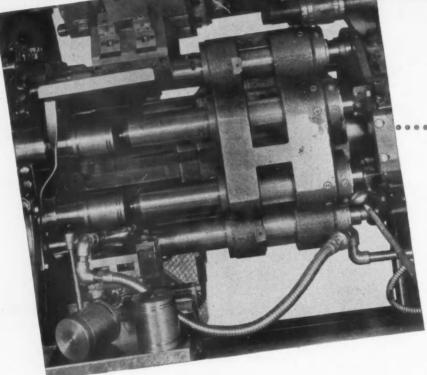
TRANSMISSIONS TORQUE CONVERTERS

PASSENGER CAR AXLES . CLUTCHES . PARISH FRAMES . STAMPINGS . UNIVERSAL JOINTS SPICER "BROWN-LIPE" GEAR BOXES . RAILWAY GENERATOR DRIVES

## PLUS ON PISTONS

MACHINE TIME: 28% SECONDS EACH





## 2nd MACHINE 14 OPERATIONS

Double indexing with duplicate tooling. Finish 2 pieces at once, using carbide-tipped tools. Machine time for both: 33 seconds (or at the rate of  $16\frac{1}{2}$  seconds each).

Now's the time—before obsolete machining methods price you out of a competitive market—to investigate the savings in time, machines and money made possible by Acme-Gridley automatics.

Inherent features of their design are speed, stamina and adaptability. Rugged, box-type frame, plus positive close-coupled, quick-change camming provide a combination that's built for speed... as fast as modern carbide-tipped tools will take. You can hog off metal without sacrificing accuracy or finish; wide, open tooling zones allow plenty of room for time-saving, power-driven auxiliaries, and for efficient chip clearance.

These are some of the *plus* values you get in Acme-Gridley chuckers and bar automatics. They're built for quick change-overs; will up your output on long or short-run jobs. May we show you how?



"HOW MONEY WAS SA ON 25 CHUCKING JOI

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Ask for your copy this fully illustrated booklet of actual duction jobs on Ad Gridley chucking at matics.

The NATIONAL ACME CO.

170 EAST 131st STREET . CLEVELAND 8, OHIO

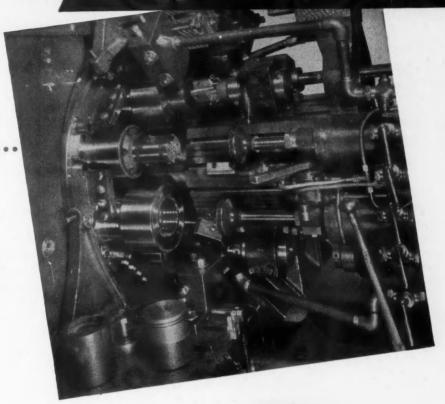
Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog · Limit, Motor Starter
and Control Station Switches • Solenois
Centrifuges • Contract Manufacturing

# ACME-GRIDLE PERFORMANCE

25 OPERATIONS - TOTAL

#### 1st MACHINE 11 OPERATIONS

Double indexing, alternate internal and external chucking. Rough finish both ends of piston, using carbide-tipped tools. Machine time: 12 seconds.

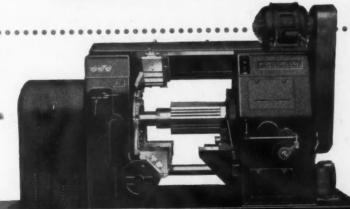


#### 6"-8 SPINDLE ACME-GRIDLEY

Chucking automatic as used on the piston production job pictured.

#### OTHER CAPACITIES

10"-4 Spindle 8"-6 Spindle 12"-6 Spindle



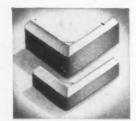


# Fansteel ELECTRICAL CONTACTS

#### for Heavy Duty Service

Where heavy current carrying capacity, low contact surface resistance and freedom from arc erosion are essential, there is no better electrical contact material than Fastell, a product of Fansteel powder metallurgy. Fastell combines the advantages of the high refractory metals, tungsten and molybdenum, with the high conductivity and low surface resistance of silver or copper, resulting in most dependable protection against mechanical wear, arcing, sticking and pitting. By Fansteel techniques, Fastell contacts can be made in irregular shapes at low cost and with no scrap loss.

Manufacturers of heavy duty equipment are turning to Fastell as the complete solution to their electrical contact problems. Fansteel's corps of metallurgists and electrical contact specialists welcome discussion of individual problems with design and product engineers. Fansteel Metallurgical Corporation, North Chicago, Illinois.



Fastell electrical contact metals are made in numerous grades, each for its specific service. Write for your copy of Technical Data Bulletin 7.100.



## Fansteel

ELECTRICAL CONTACTS and CONTACT ASSEMBLIES

## Improvement of Vehicle Finishes

By M. G. Bell and W. W. Bauer Pittsburgh Plate Glass Co.

A FFECTING the durability of both nitrocellulose lacquers and synthetic baking enamels is a group of properties that may be called "finishing system integrity." It includes adhesion, resistance to impact, moisture, humidity, chemicals, and corrosion of metals. In all of these properties notable progress has been made. These undercoats form an integral part of the team of materials making up a given finishing system. To get the maximum in performance, each coating material in a finishing system must perform its function and assist the others.

The automobile industry has taken numerous positive steps to enhance the finishes in use by plant lay-outs and equipment installations. These include metal pre-treatment, specially designed spray guns and fluid paint handling equipment, efficient baking ovens, improved spray booths and air

conditioning equipment.

Although much has been accomplished by the cooperative effort of the industries, latitude still remains for further improvement. In the case of the established finishes, improvements of a somewhat smaller magnitude can be expected as technological advances can be made. These painting materials are actually semifinished products; the making of the final product is in the hands of the automobile manufacturer. Like other engineering materials, they have performance limits. Failure to understand and recognize these limits can result in a depreciation of the performance originally built into the product. Fortunately, with the broadened latitude which finishing materials now provide and a more thorough understanding of limitations by the user, there are relatively few examples of misuse. However, there are occasional examples where lacquers are force-dried too near the temperature of decomposition of nitrocellulose, or where lacquer films are applied at such excessive thickness as to invite thermal cracking. In other cases, film thickness is not uniformly controlled to gain maximum moisture and corrosion resist-

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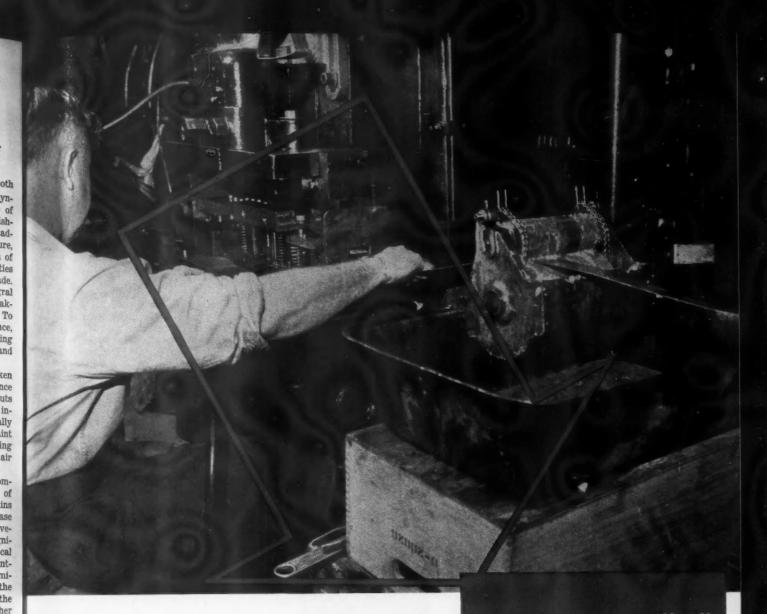
Or

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Com

#### Slepian of Westinghouse Gets Edison Medal

Dr. Joseph Slepian, associate director of the Westinghouse Research Laboratories, was awarded the Edison Medal of 1947 at the Winter Convention of the American Institute of Electrical Engineers in Pittsburgh, Pa. He was honored for his outstanding contributions to lightning protection, high-voltage circuit breakers, and other electrical apparatus.



# w bottleneck in brass stamping was eliminated with . . . . .

Stanostamp "C"

Problem—A midwest manufacturer of band instruments found that stamping of brass-horn spacer brackets from flat brass strip was tying up production. Spoilage was high because of galling or scratching of parts during stamping.

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Solution — A Standard Oil Lubrication Engineer recommended Stanostamp "C" and the simple method of application illustrated. Before it enters the press the brass strip is run between two felt rollers which coat the strip with Stanostamp "C" emulsion.

Results—Part spoilage has been reduced 50%. Spacers have a fine finish—so important in band instrument appearance. Die life has been increased and the production bottleneck has been broken.

On any new or troublesome stamping operation, the suggestions of a Standard Oil Lubrication Engineer may save you experimentation and production time in determining the most economical stamping compound and method of application. Write Standard Oil Company (Ind.), 910 S. Michigan Ave. for the Engineer nearest you.



Top-Brass strip is fed through rollers which coat it with Stanostamp "C" emulsion, permitting a fine scratchless finish on horn parts.

Above-Horn spacer bracket being attached to instrument.

STANDARD OIL COMPANY (INDIANA)



#### British Vehicle Exports Higher Than Prewar Volume

WITH an output during 1947 of 445,000 automobiles, of which 287,000 were passenger cars and 158,000 trucks and utility vehicles of various types, Great Britain headed all European countries by a big margin. Total production is equal to that of 1938, being lower in passenger cars and higher for trucks. Although this constitutes a postwar record, it does

not represent the full possibilities of the British industry.

During the year emphasis was strongly on exports, the proportion at the beginning of the year being 46 per cent for cars and 30 per cent for trucks. During the last three months of 1947 the proportions were stepped up to 64 and 37 per cent, respectively. During the October to

December period the number of cars shipped abroad had reached almost exactly 75 per cent of the monthly target rate set by the Government for the middle of 1948.

British passenger car exports for January totalled 16,000 units, representing 67 per cent of production. In 'addition 5000 trucks, buses, etc., were exported during this period. The monthly automobile export rate jumped from 7200 in 1946 to 11,900 in 1947.

#### Sell 10,000 Passenger Cars, Trucks at Brussels Show

According to R. Gresham Cooke. director of the S.M.M.T., the recent Brussels show brought British manufacturers orders estimated at 10,000 passenger cars and trucks, with a value of more than 12 million dollars. According to Mr. Cooke, the four main reasons why British cars are selling well abroad are: (1) the British car is cheaper than the American car; (2) British cars are economical, this being important with a world shortage of gasoline; (3) limited parking space in many countries gives advantage to a car that is light and easy to park; (4) market research shows that even in America 20 per cent of the public want a medium or small car.

Taking the Portuguese market as typical of world's markets, Mr. Cooke claims that the cheapest car there is is the British-built Ford Anglia at 35,000 escudos, followed by Morris, Ford, Standard, Renault and Vauxhall. The lowest priced American car is the Chevrolet Fleetmaster listing at 66,500 escudos, followed by nine other American cars. The most expensive car is the 91½ cu in. Jaguar at 90,000 escudos, or 460 escudos more than the Chrysler Windsor sedan.

New passenger car registrations in England were 145,000 for the year 1947. This total included 7000 exarmy cars. This total is half the average registrations for the three years preceding the war. It is expected that it will be lower in 1948, because of export demand. New truck registrations rose by 46,000, but half that number was composed of former military vehicles adapted for civilian use.

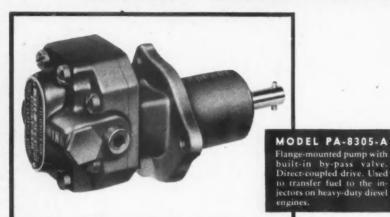
#### Exports for 1947 Total 192,000 Cars and Trucks

Automobile exports in 1947 averaged better than \$29,600,000 per month. The shipments for the year included 143,000 cars and 49,300 trucks, being respectively 210 and 346 per cent of the 1938 volume. The British Commonwealth and Empire, Australia, New Zealand, India, South Africa and Eire took 60,000 units, the bulk of the exports. Belgium headed the foreign countries, with

(Turn to page 244, please)

## John S. BARNES

## Constant-flo ROTARY GEAR PUMPS



## HIGH VOLUMETRIC EFFICIENCY and LONG LIFE --for Stationary and Mobile DIESEL Applications



Designers and builders of diesel engines will find, in BARNES Constant-flo Rotary Gear Pumps, units which are ideally suited to the

requirements of diesel applications.

BARNES Constant-flo features include: 
An exclusive gear-tooth structure which gives high volumetric efficiency over a wide temperature range with low viscosity fluids.

A streamlined-flow by-pass valve which gives close effective pressure control on engine drives from low idle to governed speed.

Precision manufacture to split-thousandths

tolerances on mass production machinery.

• Quality materials, including heat-treated

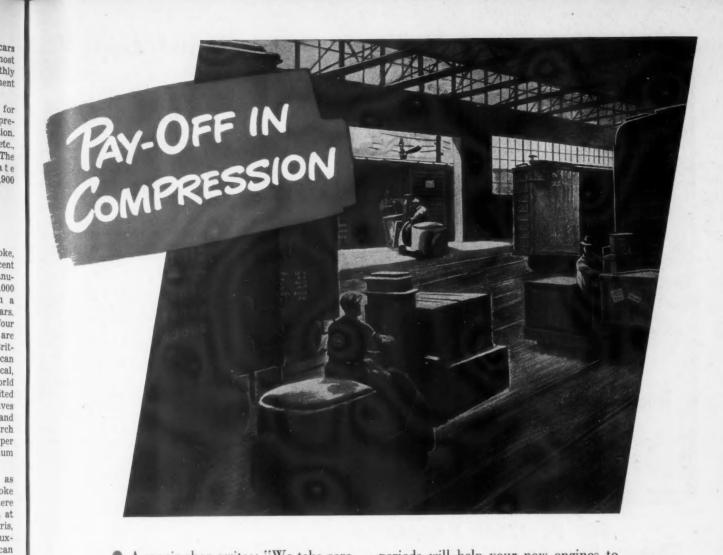
alloy cast iron and alloy steels, for durability and long life. • A spring-loaded synthetic seal, specially developed for Constant-flo Pumps, which has Underwriters approval. • A shear pin to prevent serious damage to the pump in case large pieces of foreign matter enter the pump proper. • A testing procedure whereby each pump is tested to actual operating conditions.

Write today for descriptive literature and engineering data sheets suggesting numerous applications.



JOHN S. BARNES CORPORATION 301 S. Water St., Rockford, Illinois

Compact, Efficient, HIGH QUALITY, Long-Life Oil Pumps



• A repair shop writes: "We take care of 30 Lift Trucks with four-cylinder engines. These machines run from 16 to 20 hours a day. We estimate that one of these engines, if installed in a car, would cover from 100,000 to 125,000 miles per year.

"For two years we have been using Pedrick piston rings for all replacement jobs. Last week we made a compression test on one of our old machines—over-hauled five months ago. Not one pound was lost through the Pedrick rings. Yet a new machine, with other rings, in operation for four months, lost eight to ten pounds!"

This ability of Pedrick rings to maintain a seal in the cylinder for long deliver longer, trouble-free service and help your dealers out in the field to do better, more efficient reconditioning work. Send for information on Pedrick's exclusive "Heat-Shaping" process. Only Pedrick makes "Heat-Shaped" piston rings. Wilkening Manufacturing Co., Philadelphia 42, Pa. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto.



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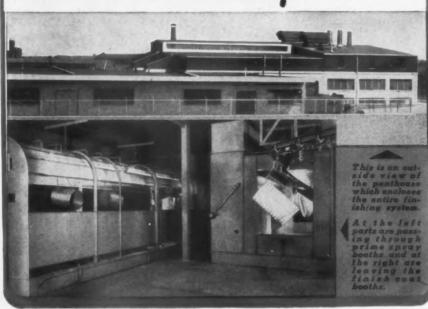
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#### **NEWCOMB-DETROIT**

Engineers — Builds — Installs

PAINT FINISHING SYSTEM
IN A PENTHOUSE /. . . . .



## TO FINISH FAMOUS Deepfreeze Home Freezers

To save valuable plant area at Motor Products Corporation's Deepfreeze Division where the famous Deepfreeze Home Freezers are made, Newcomb-Detroit installed the entire finishing system on the roof of the plant. The system includes a spray bonderite system, dry off oven, prime coat booths, prime coat oven, finish coat spray booths, finish coat oven and an air supply system to distribute conditioned air to the booths and ovens. The entire system is serviced by conveyors which are connected to the production departments below.

This is but one of the many Newcomb-Detroit installations which produce fine paint finishes efficiently and economically. During the past 35 years they have designed, built and installed finishing systems of all types in a wide variety of industries. Use this experience to solve your finishing problem.



NEWCOMB-DETROIT COMPAN

Main Office and Plant 5741 Russell Street DETROIT 11, MICHIGAN

Western Sales Office CHICAGO, III.

#### **British Exports**

(Continued from page 242)

PATE

13,000 automobiles. Other major markets were Switzerland, Sweden, Portugal and the Netherlands with a total of 20,700 units.

Home registration figures for November show a rapidly declining number of vehicles going to the English market, the figure being 8000 for the month, or less than half that for January, 1947.

It is recognized that every effort must be made to increase output and to reserve as big a proportion as possible of that output for export. For 1948 the program calls for 315,000 automobiles for export and 160,000 for the home market. The realization of this program, however, depends on supplies, particularly of steel, and if this is not forthcoming the home market will suffer.

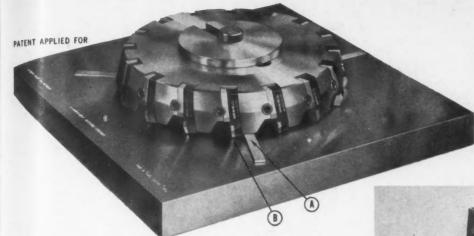
#### Reduce Car Models

By the grouping of manufacturing companies and the reduction of the number of car models, very important progress has been made. In 1920 there were some 90 private car manufacturers. In 1939 there remained only about one third of that number, or 20 independent organizations when account is taken of amalgamations or absorptions. Six organizations—Austin, Ford, Nuffield, Rootes, Standard and Vauxhall-accounted for more than 90 per cent of the 1937 output. The respective total outputs of these six in that year ranged between 112,000 and 28,000. Although these outputs were spread over a number of models, economic forces were continually driving the manufacturers to cut their costs by making the maximum use of common parts for their different models. The general public, it is stated, is unaware of the extent to which different models of the same firm or group employ common parts. The following table shows the extent to which groupings have resulted in the reduction of the number of models.

Group	Models Before Grouping		Basic Engines Before Grouping	
Daimler Lanchester	} 11	5	11	3
Humber Hillman Sunbeam- Talbot	} 22	7	13	3
Morris M.G. Riley Wolseley	} 38	10	21	5
Rolls Royce Bentley	} 3	2	3	1
Standard Triumph Total	} 24 } 98	7 31	9 57	16

Dealing with supplies of material, shortages had a serious effect in checking the rise in production. The fuel shortage and stoppages caused

(Turn to page 246, please)



1. Assembly fixture for rapid, uniform blade setting. Machined surfaces of lugs rest on parallels "A". Blades are inserted and pushed down till they touch top of plate "B", thus insuring uniform projection of 1/8 inch beyond cutter body.

## **Another Gairing Achievement**

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ES.

The New Gairing Carbide Face Mill through new process of reconditioning reduces down time of machines

#### CUTS GRINDING COSTS



2. Blade checked by gage after grinding.

In the grinding room alone, the E-Con-O-Mill saves its cost quickly. It cuts expense three ways:

- 1. New blades need no grinding. They are furnished finish-ground. They come individually cartoned to be kept in stock, ready to be assembled in cutters.
- 2. Assembly of blades is done by hand. Each is held firmly by tightening one lock screw and wedge, both being integral with body at all times. To insure uniform blade projection, we furnish the fixture illustrated (Fig. 1), which accommodates all cutter sizes. Thus accurate blade setting is assured within .0015 inch uniformity. Should greater accuracy be required,

then diamond wheel grinding to remove a maximum of .0015 inch from just the ends of the higher blades is required.

3. Re-sharpening of blades is done on a carbide grinder. A checking gage, furnished by us (Fig. 2) insures rapid and accurate duplication of cutting edges, making re-sharpened blades ready for assembly in cutter bodies. Or the blades may be put in stock, to be drawn out whenever required for assembly in bodies.

This rugged face mill offers many other economies. It uses the *same* blades and *same* locks for all sizes of cutters. And you can use the *same* cutter body for cutting steel, cast iron, and non-ferrous metals.



# E-CON-O-MILL

A New Carbide Face Mill Made in Standard Sizes 5-inch Diameter and over

REDUCE DOWN-TIME OF YOUR MACHINES
CUT DOWN YOUR TOOL INVENTORY

THE GAIRING TOOL COMPANY

21221 Hoover Road, Detroit, Michigan

#### **British Exports**

(Continued from page 244)

by weather in the spring of 1947 brought about a serious setback. Later in the year the shortage shifted from sheet steel to ordinary steel supplies and all industries were subjected to severe cuts. Other materials affecting motor production were timber, lead and paint.

Arrangements have been made by the industry for collective research through the medium of the Motor Industry Research Association. The function of this association is to provide the industry with the basic information needed to devise new product or improve existing products. Under a long-term program the association hopes to acquire a proving ground, a road circuit, a wind tunnel, a cold room and a special photographic department.

#### Nash Names P. G. Little Acting Works Mgr.

P. G. Little, former assistant works manager at the Nash plant at Kenosha, Wis., has been appointed acting general works manager. He succeeds the late Harold E. Long.

## wanted:

by

alex taub associates

One client\*wanted, interested in development work to obtain

#### maximum miles per gallon

this is a work program, not an invention, under the direct supervision of Alex Taub.

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Alex Taub Associates

1406 G street, n. w. washington 5, d. c.

(phone Executive 5677)

\* manufacturer of engines, automobiles, trucks, buses, tractors or motorcycles.

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In addition to the buyers whom your own salesmen contact.

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reaches men whose names you'll never know — but whose recommendations may mean millions to you.

Also Automotive Industries helps to create and maintain the good reputation of your product in quarters where that help will do the most good.

## Automotive Industries

A Chilton Publication

Chestnut & 56th Sts., Philadelphia 39, Pa.



# BATTERIES

# deliver the extra POWER that Diesel cranking demands

Designed specifically for the job, Exide Batteries are ruggedly built to withstand hard service

ON THE HIGHWAY—OFF THE HIGHWAY
IN ALL CLIMATES
IN EQUIPMENT OF EVERY SIZE AND TYPE

You can always count on Exide Diesel Batteries for dependable service, long life, ease of maintenance, and maximum battery economy.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto



For a filter that does the job it is designed to do can serve more than anything else to: (1) eliminate unnecessary wear and maintenance, (2) keep gum and sludge at a minimum, (3) assure more extra miles of lower cost operation.

The MICHIANA depth type Filter is this kind of accessory. It was perfected by MICHIANA engineers after extensive experience and practical field applications. As a result, operators of enginepowered equipment report that the principle and simplicity of MICHIANA Filters provide for the maximum in oil-cleaning effectiveness.

Consider the filters you use from an engineering standpoint and you will be convinced that MICHIANA Filters meet your most stringent requirements—with extra savings and economy.

> MICHIANA PRODUCTS CORPORATION Michigan City, Indiana



Request your copy of latest illustrated Bulletin 839 today.



# AUTOMOTIVE INDUSTRIES

Penetrates the

MOST PLANTS

in the

**Automobile** Tractor and Aircraft **Industries** 

# CALENDAR

Conventions and Meetings

Chicago	Production	Snow.	Chicago	
				22-24

Amer. Management Assoc. Packaging Exposition & Conference, Cleveland

Apr. 26-30

American Foundrymen's Assoc.—Foundry
May 3-7

Show, Phila. Soc. for Experimental Stress Analysis— Annual Mtg., Pittsburgh . . . . May 27-29 32nd International 500-Mile Race,

Sept. 13-17

Commercial Motor Transport Show, .Oct. 1-9

London
Society of Motor Mfrs. International
Motor Exhibition, London Oct. 28

# EVERY FOURTH PART IS A BONUS PART





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March 15, 1948

2-23 6-29

6-30

7-29

7 31

3-17

1-9

7. 6

Each ton of N-A-X HIGH-TENSILE can be made to produce up to 33% more parts. Its greater strength and corrosion resistance permits lighter sections. The saving in steel is translated into "bonus" parts—as much as one extra part for every three you now produce.

N-A-X HIGH-TENSILE CARBON SHEET STEEL

**GREAT LAKES STEEL CORPORATION** 

N-A-X ALLOY DIVISION . DETROIT 18, MICHIGAN UNIT OF NATIONAL STEEL CORPORATION



For a filter that does the job it is designed to do can serve more than anything else to: (1) eliminate unnecessary wear and maintenance, (2) keep gum and sludge at a minimum, (3) assure more extra miles of lower cost operation.

The MICHIANA depth type Filter is this kind of accessory. It was perfected by MICHIANA engineers after extensive experience and practical field applications. As a result, operators of enginepowered equipment report that the principle and simplicity of MICHIANA Filters provide for the maximum in oil-cleaning effectiveness.

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Chicago Production Show, Chicago Mar. 22-24

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for Experimental Stress Analysis— Annual Mtg., Pittsburgh . . . . . May 27-29

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**GREAT LAKES STEEL CORPORATION** 

N-A-X ALLOY DIVISION . DETROIT 18, MICHIGAN UNIT OF NATIONAL STEEL CORPORATION

# The Automobile Industry in Austria

By Leopold Vogel,

Special Correspondent for AUTOMOTIVE INDUSTRIES in Vienna

THE automobile industry in Austria is at the present time represented by five plants: Austro-Fiat, Fross-Buessing, Graef and Stift, Saurer, and Steyr-Daimler-Puch. The Graz plant of Steyr-Daimler-Puch is producing 5000 motorcycles (Puch 125) per year; and the Steyr factory can produce 2800 3½-ton gasoline trucks per year. However, production of these vehicles will be replaced early in 1948 by a new 3½-ton four-

cylinder Diesel truck is to be ready for delivery in the late autumn of 1948. Production of passenger vehicles will not be renewed because of scarcity of presses and sheet metal.

The production program of Steyr-Daimler-Puch will also include a two-cylinder Diesel tractor. Monthly production of this unit will begin at 100 units, and it is hoped that by the end of the year, 500 per month can be built. This tractor will have a five-

speed transmission, and will be powered by a 26-hp two-cylinder engine. Other features include narrow turning radius of 57 in., built-in coupling; jointed cross-shaft front axle; 65.4 in. wheel-base; and 49.3 in. width. The Steyr-Daimler-Puchwerke are obtaining a credit of \$1.83 million from the Export-Import Bank in order to bring their factories up to date.

# Exports and Imports of Motor Vehicles

In 1938, Austria exported 500 motorcycles, 900 passenger vehicles, and 160 trucks. In 1947, exports are still only half under way; agreements have been carried out with Switzerland, Belgium, Poland, Hungary, and Turkey; the sole non-European country on the export list is China.

The importation of motor vehicles also remains within very modest limits: Instead of the 1700 motorcycles, 1000 passenger vehicles and 50 trucks of 1938, only a few buses (Italy) and passenger vehicles (France) by way of compensation transactions, were brought into the country. Imports for this year, however, should increase; thus arrangements have already been made, within the framework of the pound sterling credit, with the English automobile firm, Jawett-Bradford, for the delivery of 10 units per month of their small truck (1650-lb useful load) which has a fuel economy of about 34 mpg, and costs 15,000 schillings: English motorcycles (30.5 cu in.) are also to be imported. Large importations are in view also with the commercial agreement concluded with France: trucks in the amount of 70 million francs, passenger vehicles in the amount of 10 million francs, as well as automobile accessories, spare parts, and electrical equipment for automobiles, in the amount of 35 million francs, will be imported, for which Austria will deliver magnesite, super-refined steel, wooden houses, and 200 tons of vineyard snails.



The harder your gage blocks have to work, the more you'll SAVE with chromium-plated Jo-Blocks. Wherever service is at all severe, they'll far outlast the plain steel blocks.

The resistance of chromium-plated Jo-Blocks to abrasion or impact is many times that of unprotected steel. They are also far more resistant to corrosive effects of skin acids and moisture. Being lapped and burnished to specified dimension *after* plating, their warranted accuracies are precisely the same as those of unplated Jo-Blocks.

Old sets of Jo-Blocks or gage blocks of any make, in sizes from .050" to 4.000", may be turned in to the factory for credit on new chromium-plated sets. New chromium-plated Jo-Blocks may also be purchased without trade-in.

The first chromium-plated gage blocks were produced by Ford Motor Company more than twenty years ago. Service records abundantly prove the vastly longer life of these fine, hard-surfaced tools. Write for literature.



#### Tire and Fuel Bottleneck

In comparison with 1946, the tire and fuel situation has not become any better, but on the contrary has become still more difficult.

The principal supplier is the Semperitwerke in Traiskirchen (lower Austria), which comprise 80 per cent of Austrian production. Because of the shortage of machine tools, only 2000 tires per month (40 per cent of the prewar capacity) are produced, which corresponds to around 4 per cent of the actual need. Importations of tires are impossible because of the lack of exchange.

The fuel problem unfortunately is bound up with the still pending Austrian treaty, since the Austrian oil fields in Zisterdorf are considered as German property, so that the Austrian government has no exploitation rights. The domestic needs on the

(Turn to page 252, please)





Cabin Air Exhaust Screens

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101 MI ION ION IN RESIDENCE

Firewall Fuel Strainer

Carburetor Air Screen

Carburetor Fuel Strainer

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80 E

Fuel Tank Strainers

Scavenger Oil Screen

Pressure Oil Screen

Magneto Ventilator Screen

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## FOR THE AIRCRAFT

Aviation continues to make spectacular history. Speedier military planes streak through the skies. Colossal flying boats and passenger transports become more and more luxurious. Planes wing their way to the earth's remotest places. Not only the aviation industry itself, but other manufacturers, too, have nurtured this progressive growth. Reynolds Wire Co. is a conspicuous example. Reynolds skilled craftsmanship, resources, and intelligent, purposeful research, as it has for years past, will continue to contribute to aircraft development. When it's wire cloth-consult the Reynolds Wire Co.

#### WIRE REYNOLDS

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\*THREDKUT, a versatile, heavy-duty cutting oil, is famous for its top performance on jobs found to be too tough for other oils. Due to the stabilized balance between its uniformly high anti-weld value and its other desirable cutting characteristics, it is especially efficient in the machining of tough, stringy metals and for the more difficult operations, such as thread cutting, tapping, broaching and gear shaping.

As supplied, THREDKUT is scientifically correct for the severest metal-working conditions. For less severe conditions, it can be diluted with from 4 to 20 parts of low-cost blending oil. Properly applied, it will out-perform competitive cutting fluids on 3 out of 4 machine operations.

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STUART oil engineering goes with every barrel

D.A. Stuart Oil Co.

2733 S. TROY STREET, CHICAGO 23, ILL.

# Industry in Austria

(Continued from page 250)

basis of a requirement program presented a few weeks ago, amount to 7000 tons of gasoline and 12,000 tons of Diesel oil per month. These quantities, however, will not actually suffice; much more is needed for essential road traffic; and for agricultural purposes, 12,000 tons of gasoline and 10,000 tons of Diesel oil. Actually, however, the government will allow for distribution a monthly average of 3500 tons of gasoline (60 per cent of the total production) and 6000 tons of Diesel oil (33 per cent of the total production). If, on the basis of a recently concluded agreement, 2000 tons of gasoline and 1000 tons of Diesel oil are imported monthly from the U.S.A., even then it can certainly not be said that fuel worries are a thing of the past.

# French Vehicle Output Increases

With an increase of 46.3 per cent, French automobile production reached 126,652 units during the first eleven months of 1947. The figures show 61,059 passenger cars and 65,593 trucks and other utility vehicles. The biggest producer of passenger cars was Citroen, with 20,637, followed in order by Renault, Peugeot, French Fiat and Ford. In the truck division Renault heads the list with 22,218, followed by Peugeot, Ford and Citroen. Chausson was the biggest coach producer.

The government program for the first six months of the present year provides for a production of 54,000 passenger cars and 34,491 trucks. On this basis production will be up more than 30 per cent compared with 1947. Manufacturers claim that production could be boosted considerably if adequate steel supplies were available. According to Baron Petiet, head of the National Federation, the French industry receives only 350,000 tons per annum instead of the 700,000 tons it requires. By comparison, the supply of steel to the railways has risen from 450,000 tons just before the war to more than one million tons.

The recent devaluation of the franc should assist in export business at a time when production is increasing.

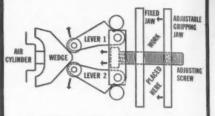
### Body Engineers Elect New Officers

At their annual meeting held recently, the American Society of Body Engineers elected the following officers and trustees for the coming year: President, Alfred H. Haberstump; Vice-President, Arthur L. Bradley; Secretary, Albert W. Arndt; Treasurer, Willian K. Norwick; Trustees, Carl W. Cenzer, Edgard C. DeSmet, Otto F. Graebner, August Keller and Charles Walker.



#### THE GUTS

This diagram of the patented Senior AIRLOX linkage shows the wedge and lever utilizing total cylinder drive.



The wedge, driven by the air cylinder, forces the levers apart on their fulcrums to pull the gripping jaw toward the work and fixed jaw. Adjusting gripping jaw and stroke permits locating work with assured operator safety.



#### THE S-13 PNEUMATIC VISE

The AIRLOX Model S-13's quick power stroke speeds production.

For most machine and bench work. Timing of jaw movements with machine used provides automatic operation. B. & S. jaw hole spacing, or your own, allows using your present jigs and fixtures. Enclosed against chips and cutting oils. Carefully ground jaw faces. Special alloy construction. Accurately flanged and keywayed. Hydraulic drive optional.

#### **SPECIFICATIONS**

Overall: 5 1/4 x 8 % x 29 in. Weight: 130 lb. Stroke: 1/16 to 1/2 in. Jaw-face size: 7 x 1 1/4 in. Maximum space between jaws: 12 in. Gripping force: air-line pressure times 90. Increased pressure optional.

Write for data sheet S-13.

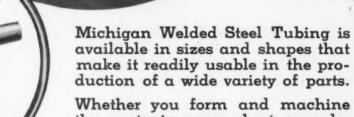
production devices, inc. Whitehall, New York

AIRLOX: The complete line of pneumatic and hydraulic vises



The Modern Electric Resistance Welded Steel Tube

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Whether you form and machine the parts in your plant or order them prefabricated by Michigan, you will find this tubing exceptionally uniform in structure and adapted to reworking by any production process.

Michigan welded tubing can be:

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Engineering advice and technical help in the selection of tubing best suited to your peaks. Address immittee to

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1,000 TON LAKE ERIE Hydraulic Press in the Solar Aircraft Company plant in San Diego, Calif. The press is a self-contained, column type, double action unit with double platens. Platen dimensions are 146" right to left, 85%" front to back and 66" x 60" for the cushion platen. The press has a 36" stroke and 49" daylight opening.

# SOLAR AIRCRAFT

produces cooling tower fan blades 25% faster

ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

with LAKE ERIE Hydraulic Press

There is a sound, economic reason why so many well-known manufacturers are installing the latest hydraulic presses. In plant after plant, these automatic and semi-automatic presses are increasing production, improving product quality and lowering unit costs. The experiences of the Solar Aircraft Company are typical of the advantages enjoyed by countless manufacturers in the automotive, farm equipment, home appliance, electrical and other fields where these high-speed presses are at work. The advantages are worthy of investigation. A good way to get the facts quickly is to consult Lake Erie's engineering staff. They'll be glad to assist you without obligation.



THE LAKE ERIE PRESS is also used to manufacture many other products including stainless steel side panels, bottoms and ends for caskets, which are produced at the rate of from 35 to 60 per hour.



#### LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

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General Offices and Plant:

509 Woodward Avenue, Buffalo 17, New York

OFFICES IN PRINCIPAL CITIES AND FOREIGN COUNTRIES



LEADING MANUFACTURER OF HYDRAULIC PRESSES - ALL. SIZES AND TYPES - METAL WORKING...PLASTICS MOLDING FORGING...METAL EXTRUSION....PROCESSING....RUBBER VULCANIZING...STEREOTYPING...SPECIAL PURPOSE

# Chronology of Failure of Wartime Materials Controls

Prepared by Washington Research Staff, **Automobile Manufacturers Association** 

Action Date

5-29-40 Creation of the National Defense Advisory Commission.

6-17-40 Establishment of Priorities Commission and voluntary controls.

6-28-40 Enactment of legal priority authorities for President.

Failure of voluntary pri-Aug. to Oct. 1940 orities because of conDate Action

flicting civilian and military demands.

Creation of Priorities 10-18-40 Board.

10-21-40 Issuance of Executive Order delegating legal priority powers to Priorities Board.

Struggle between NDAC and Army over authority; Further breakDate Action

downs of priorities.

1-7-41 Creation of Office of Production Management to answer critics who said NDAC had no chairman; Delegation of priority powers.

2-18-41 Withdrawal of primary priorities powers from OPM priorities Board and grant to ANMB; beginning of Army and Navy blank check period.

OPM regulation giving 3-7-41 civilian items priority necessitated by war priority impact.

Super-rating begun; no orders honored less than A-10 by May.

3-17-41 ANMB authorized to assign priorities to all Army and Navy programs because OPM lacked personnel to handle priority applications. "Civilian control of priorities was lost."

Institution of Defense Supplies rating plan to apply blanket ratings to percentages of production.

June, 1941 By June, 1941, "The priorities system was in process of breaking down" because impossibility of handling paperwork. First reorganization of OPM over

question of imposing priorities on civilian items.

Creation of Supply Pri-8-28-41 orities and Allocation Board.

Sept. 1941 Second reorganization of OPM; Nelson revises PD-1A procedure to substitute stamped certification in lieu of sending out PD-2's.

Dec. 1941 Third reorganization of OPM because of jurisdictional disputes between OPM, SPAB, and other agencies.

Aluminum, rubber and steel expansion debate.

Beginning of Production Requirements Plan and end of Defense Supply Rating Plan.

Rating plan priority of A-10 had become inadequate to insure deliv-

PRP gave blanket ratings for all estimated materials needs 90 days in advance.

Creation of WPB, with 1-16-42 sweeping powers over all agencies. This was to engender later priority disputes with Army and Navy. SPAB and OPM were abolished.

5-30-42 PRP made mandatory effective July 1.

Introduction of the new system plunged WPB into administrative confusion and jurisdictional bat-

Conflict between PRP and proposed "warrant system" of alloca-

Priorities inflation flourished un-(Turn to page 258, please)



Scores of users have found that they save time, trouble and money by turning their electrical wiring harness problems over to Essex specialists.

Essex One-Source service handles the intricate job of producing lighting, ignition and control harness assemblies custom-built to your exact specifications and complete with all manual and electrical control devices for quick, efficient installation.

Through intensive specialization in wiring harness assemblies, Essex has developed line production methods of manufacturing, assembly and inspection, for economical production of high grade, individually tested, specially engineered assemblies.

INVESTIGATE ESSEX "ONE-SOURCE" SERVICE TODAY!



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Sales Offices: Chicago, Ill.; Cleveland, Ohio; Dayton, Ohio; Detroit, Mich.; Kansas
City, Mo.: Los Angeles, Calif.; Milwaukee, Wis.; Newark, N. J.; Philadelphia, Pa.;
San Francisco, Calif.; St. Louis, Mo.



Few indeed-if there is NI-RoD\* in your welding shop.

Welders all over the country report that Ni-Rod saves time and money, and rescues castings from the scrap heap.

NI-ROD makes machinable welds in cast iron . . . joins cast iron to steel . . . makes it easy to repair cracked, porous, and imperfect castings.

Here is what welding men are saying about NI-RoD:

- "NI-Rod's ease of handling shortcuts special steps like preheating, and reduces labor time."
- "NI-Rod's crack-free, non-porous nickel deposit fuses completely with cast iron under the toughest welding conditions."
- "NI-Rod's smooth flow keeps down hardness.

  NI-Rod welded castings are easy to machine."

Try NI-Rod in your own welding shop. Order a five pound package today. Your distributor stocks it in 3/32'', 1/8'', 5/32'' and 3/16'' diameters.

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Alloy Metal Sales, Ltd.
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Roto-Finish is a mechanical deburring and finishing process—producing staggering savings in labor costs over manual operations. One operator can finish quantities of parts uniformly and accurately in a fraction of the time required by hand. Roto-Finish likewise removes a job that is tedious, time consuming and distasteful to employees. It eliminates need of elaborate, costly dust control systems. Send samples of die castings, sand castings, stampings, machined parts, forgings for processing. (Include finished part for guide.) No obligation!

Unretouched illustration shows copper segment at top before Roto-Finish de-

burring and finishing; below after Roto-Finishing.

THE STURGIS PRODUCTS CO. 865 JACOB ST., STURGIS, MICHIGAN



# Materials Controls

(Continued from page 256)

Date

Action

der PRP with requirements and materials control vague.

Priority processing fell behind, and PRP applications were processed mechanically with the result that sometimes material grants were not filled.

6-1-42 Introduction of Allocations Classification System to get data about end uses and "end guesses" about requirements.

6-12-42 ANMB granted concurrent priority powers over materials.

July, 1942 First WPB reorganization, necessitated by the collapse of the preference rating system, with attendant priorities inflation because of lack of coordination between WPB and ANMB.

Nov. 1942 Second WPB reorganization to improve programming and facility planning. No agreement between WPB and War Department on size of military requirements.

WPB blamed priority failure on Army and Navy "blank check" system and resultant lack of centralized priority control.

11-2-42 Adoption of the Controlled Materials Plan, a vertical method of allocation by the flow-down method to bring demand within supply. Method was to become effective in April, 1943, and mandatory after July.

11-5-42 Allocation Classification System revoked because "confusing to industry and the War Production Board itself."

Dec. 1942 By the close of 1942, emergency treatment was being accorded so many projects as to endanger the effectiveness of both emergency and the lower rated orders. To bring order out of chaos in the super-rating field, WPB limited AAA ratings to special emergency bottleneck items. Moreover, a new wave of special directives was expected in 1943.

"In 1942 material estimates from the Services were still subject to a wide margin of error. Specifications for end products were not firm, unit weights were unsatisfactory and bills of material were inaccurate."

This situation persisted into 1943, "yet WPB failed to develop within its own organization a systematic and effectual review of the statistical, technical aspects of the estimates submitted by the military claimants."

WPB, lacking information and responsibility on military strategy and without control over procurement was ill-equipped to calculate military end product requirements. "Among the causes of apparent shortages were: The continued

(Turn to page 260, please)

# SAVE PRODUCTION TIME



WALTHAM SCREW
Company

Your production will
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Screw Company specializes in quality and uniformity in precision
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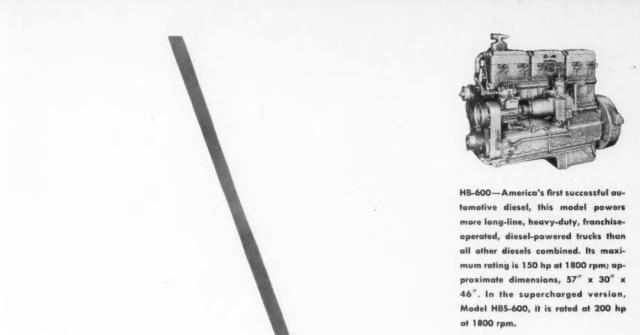
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NHB-600-Basically the same in construction and design as the Model HB-600, this model obtains increased horsepower output through use of dual valve construction, increased piston displacement and higher rpm. Its maximum rating is 200 hp at 2100 rpm; approximate dimensions, 61" x 29" x 48".



NHBS-600—This supercharged version of the Model NHB-600 develops a maximum of 275 hp at 2100 rpm, and yet weighs less than 10.5 pounds per horsepower. It, too, was developed from the Model HB-600 Cummins Diesel Engine and incorporates all its provedon-the-road features. Approximate dimensions: 60" x 32" x 49".

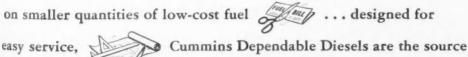


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# **Materials Controls**

(Continued from page 258)

Dec. 1942

production of non-essential goods, accumulation of excess inventories, inadequate control of the flow of materials; curtailment of facilities projects designed to increase materials production even though a disproportionate expansion of fabricating facilities was permitted; failure to grapple with the scarcity of components, and overemphasis on the supply of raw materials as contrasted with the

Date

Action

processing of materials into shapes and forms."

January The swinging over of a through nation's industry to a April, 1943 new "vertical system" was a new complex venture; the training of government agencies acting as claimants for controlled materials to adjust their programs to limited materials was more dif-

ficult yet.

Jan. 1943 Introduction of CMP did not automatically solve over-statement of requirements. It was difficult to eliminate duplication of figures. Date Action

2-27-43 Issuance of General Scheduling Order M-293 to expedite the production of components effective May 1 (special equipment, motors, etc.).

While component scheduling was popular and well received by in-

dustry;

The imposition of the scheduling procedure "was bound to create confusion and manufacturers often had to choose the set of rules they

intended to follow."

WPB said: "The basic system of preference ratings including AAA's ratings was supposed to be literally followed. On top of this were the special directives which took precedence over the preference ratings. Then there was CMP with a vague mention of production schedules that were unaffected by preference ratings other than AAA's. Last comer to the scene was M-293 and other scheduling orders which were to be followed without regard to any other order or regulation of WPB."

4-1-43 When CMP was already starting its first quarter of partial operation, Program Vice Chairman Krug pointed out that for many areas of production bills of material were still unavailable; yet without such bills, the feasibility of utilizing CMP for sound scheduling could not be realized.

4-21-43 Controversy between War Department and WPB over how much material should be allotted on a vertical flow-down basis, and how much on individual priority applications. Krug called Army proposals a request to do away with CMP.

4-27-43 An extensive field survey revealed continuation of the long time practice of padding by manufacturers in the first instance, and then by claimant agencies as a further insurance against having to cut their production schedules.

May, 1943 To meet the need for long time advance production planning Krug authorized claimant agencies to make allotments for the 4th quarter of 1943 and for the first two quarters of 1944 up to amounts authorized for third quarter.

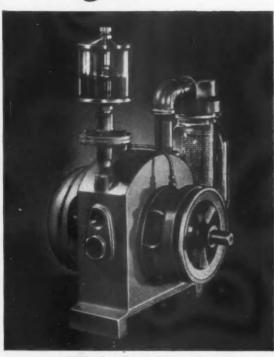
5-28-43 Revision of CMP Regulation No. 1 to permit material allotments and applications on a quarterly basis.

6-1-43 "To stop the gaps Krug announced the Component Scheduling Plan. CSP was to achieve only moderate success. The plan involved added burdens of paper work and industry representatives were disposed to regard it as a highly theoretical device extremely difficult of application.

9-17-43 M-293 revised because of WPB administrative difficulties and to schedule end items to mesh with component scheduling.

(Turn to page 264, please)

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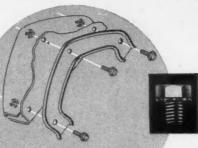
FASTENINGS by SHAKEPROOF



The improved fastening methods illustrated on these pages are typical Shakeproof solutions to common automotive assembly problems...more dependable, simplified, and less costly. In every case, they were developed through joint effort by automotive designers and production men, and Shakeproof fastening specialists. As examples, they serve to demonstrate the advantages achieved by close cooperation between manufacturers and Shakeproof engineers. This free fastening service is available to all manufacturers on request. Write today!



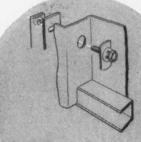
Latching type Shakeproof "Speed Nuts" save valuable assembly time in fastening rear fenders to the body.



Sems-by-Shakeproof with external-internal type lack washers secure the rear deck lid hinge against vibration.



Window run channels are locked tightly with Sems-by-Shakeproof with countersunk lock



Difficult radiator grill assembly is simplified with Sems-by-Shakeproof incorporating modified dome type lock washers.

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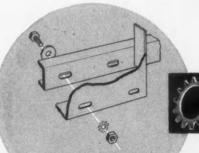
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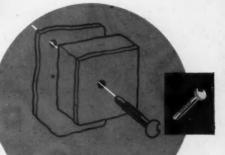
2501 NORTH KEELER AVENUE CHICAGO 39, ILLINOIS

\*Trade Mark Reg. U.S. Pat. Off.

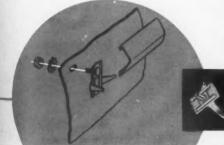
# WRITE FOR SAMPLES ...



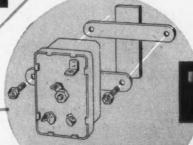
Shakeproof Lock Washers secure the front fender reinforcing bracket assembly against loosening under road vibration.



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# **Materials Controls**

(Continued from page 260)

ate

Action

Production Board tended to deteriorate in 1944 as the actual center of power shifted. WPB's decisions on allocation of materials, components and facilities had less importance for these were not the resources that in 1944 controlled the size and composition of the war production program. The critical resource was manpower which was under the jurisdiction of the War Manpower Commission.

Through much of 1944 WPB found itself an equal, rather than a superior, of the agencies represented around its own council tables. WPB could not act contrary to the firm views of such agencies as the Armed Services and WMC without inviting an appeal to higher authority. That higher authority was often the Director of War Mobilization rather than the President.

July, 1944 New Programs were brought into the production urgency list, and by the end of the month, the constant additions without substantial deletions had resulted in about 35 programs all labeled "must."

Aug. 1944 Again without deletions from the list there were added the Army cotton duck and duck substitute tentage program.

Sept.- No changes made in Oct. 14 production urgency list. 10-15-44 The list of "must" programs was completely overhauled largely in recognition of the fact that gradual accretions to the list had cheapened the value of the classification. "The standard pattern of inflation of priority currency had once again been repeated."

Nov. 1944 Lengthening of the production urgency list started anew with addition of 100 octane gasoline and brass strip mills.

Dec. 1944 Small arms ammunition and field and assault wire, in addition to steel components already on the list were added.

1-15-45 As of the middle of December, 1944, supplies of controlled materials seemed adequate to meet all screened demands for military programs.

"By the middle of January this comparatively comfortable position of the materials under CMP had proved an illusion, and although the situation never reached the critical proportion of earlier days of the war, it did become serious in certain areas."

H. G. Batcheller warned the Board on January 16 that although materials had not been an important retarding factor in most of the critical programs, they were threatening to become so in a few instances.



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Carburetor efficiency can be measured in a great many ways—fuel economy, engine efficiency, long life, trouble-free service, to name but a few. Only by building carburetors which bring engines to peak performance can these characteristics be obtained—and that's the Zenith\* way. Thirty years of specializing in the heavy-duty field has built up a line of fine products unequalled for quality and efficiency. Specify Zenith—your assurance of reliable carburetion and more miles per dollar! Your Zenith distributor will be glad to serve you, or write the factory direct.

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194

# Profits in 1947 Lower

(Continued from page 81)

its to replace worn equipment at present higher prices.

Is this merely a hypothetical argument or does it really happen? That such a thing actually happens is borne out by the accompanying tabulation, a summary of figures used in testimony by Secretary of Commerce W. A. Harriman before a Congressional Committee in January and by George O. May.

As the tabulation shows, while corporations' profits before taxes were \$27.8 billion in 1947, disposable income (income available for dividends or expansion) was \$10 billion. The disposable income of corporations for 1947 was 4.9 per cent of the national income as compared with 7.4 per cent in 1940, a prewar year of relatively good business.

In 1940, profits of corporations, before taxes, were only \$8.8 billion. Disposable profits in 1940, however, were billion, or 7.4 per cent of the national income. While the 1947 income appears high in terms of dollars, the disposabe income did not increase nearly as fast as the national income.

This condition is regarded as a real threat to business operation because the returns in profits are not enough to permit expansion by the re-investment of earnings or to pay the dividends necessary to attract the additional capital from investors which industry needs to provide more jobs to make the goods we need.

In 1947, disposable income and the investment in new common and preferred stock were not enough to pay for the cost of expansion after allowing for modest dividends. Cash was drawn down by \$1 billion and in addition a debt of \$4 billion was incurred. This action, obviously, cannot be repeated indefinitely together with the maintenance of a going national economy.

The low level of common stock prices which have been declining since July 1946 reflects and confirms the fact that true disposable income of business corporations was low in 1947, perhaps dangerously low.

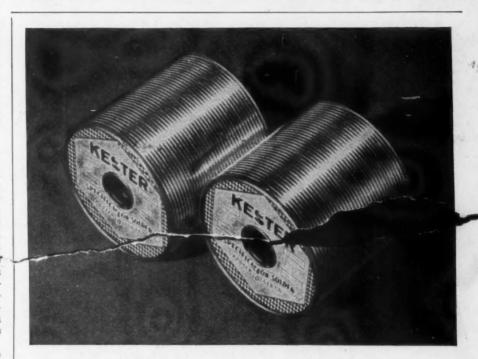
## Shipments of Housing Type Trailers by Plant Location—1947

					-						_	_	-	
California														13,223
HIIIIO18								_						13,501
maiana														15,042
Muchigan														19,736
MUSSOULI														709
OTHO														2,031
All Other	2	t	a	t	e	3	*					è		5,854
Total .							0							70,078

Industry Division—Bureau of Census.

# AUTOMOTIVE INDUSTRIES

Penetrates into Leading Plants
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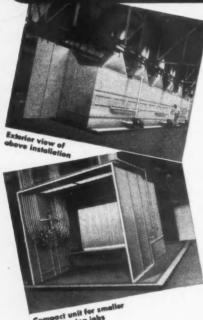
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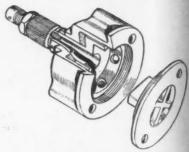
#### PAINT-LADEN AIR IS

"TORNADO" CLEANED, Operators, working in a Schmieg Centri-Merge Spray Booth, are adequately protected from fire and fumes. Overspray is carried on an air stream horizontally away from work into a curtain of water, pressure-fed through slots extending continuously full width of booth, that descends down the flood sheet. The mixture of fume and paintladen air and water is then whirled under the flood sheet and hurled with tremendous impact against the impingement wall at back of booth. Down this impingement wall flows an additional sheet of water that floods the foreign matter, pounded out in the process, into the sludge tank below. Only CLEAN AIR passes through exhaust fan. Thus the danger of fire is suppressed both in front and behind the flood sheet. Because the ratio of water and air is far greater in Centri-Merge, paint and other gummy substances do not pile up on the hard-toget-at walls of the chamber behind the flood sheet; therefore, cost of repeated cleanings is eliminated.

# THE SOCIAIR PURGE CENTRI MERGE CENTRI MERCE CENTR MERCE CENTRI MERCE CENTRI MERCE CENTRI MERCE CENTRI MERCE CENTR MERCE CENT

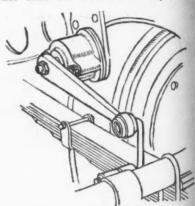
# New Shock Absorber Uses Uncured Rubber

A NEW non-liquid shock absorber, the Rotoflo, which utilizes uncured synthetic rubber as a damping agent, has been developed and is now being manufactured by Universal Dampers, Ltd., Birmingham, England.



Exploded view of the Rotoflo shock absorber.

The Rotoflo shock absorber, illustrated in the accompanying drawings, consists of a circular metal housing containing a hollow drum-shaped rotor on a spindle, to the outer end of which the connecting arm is joined. In the circumference of the drum are several radial holes which act as anchor keys for the uncured synthetic rubber filler. Screwed into the back of the housing is an end plate which has an anchor tongue across its diameter. This tongue keys the filling substance to the body. When the device is assembled and filled, any attempt to move the outer damper arm will cause the rotor to rotate. This action is opposed by the frictional resistance of the viscous material which must flow from one side of the anchor tongue to the other in order that the outer arm may move.



Mounting of the new shock absorber is illustrated here.

### James Resigns From Ford To Join Fram Corp.

William S. James has resigned as a director of research for Ford Motor Co. to become vice president in charge of engineering for the Fram Corp. of Providence, R. I. Mr. James joined Ford in April, 1946 and prior to that had been chief engineer at Studebake. He is a former president of the SAL Pending selection of a successor, Robert H. Kohr, assistant to Mr. James was named acting director.

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# Air Force Plans Extensive Research

ALTHOUGH most of the current projects are largely general in character, it is quite noticeable that research and development plans of the U. S. Air Force place increasing emphasis on factors pertaining to transonic and supersonic flying. A large number of such contracts were negotiated and projects gotten under way during the current fiscal year; Defense Department officials say that still a larger number are expected to be let out to various scientific organizations and educational institutions during the 1949 fiscal year.

Solution of the problems likely to

be encountered in the transonic and supersonic speed range demands that a great deal of attention be concentrated upon new developments along structural and power lines. In this respect, however, officials admit, considerably more investigation must be conducted into the field of dynamics before reliable and suitable criteria is obtained for design and evaluation of the stability and control characteristics of highspeed flight.

Currently, only generalized research and test programs are being carried out in the field of aircraft dynamics. Experimental programs are studying the aerodynamically induced vibration of airfoils and control surfaces at highspeeds; also, a test program is under way to measure the oscillatory aerodynamic forces and flutter tendencies of control surface tabs which have been responsible for several cases of flutter which were experienced in service.

#### Flutter at Supersonic Speeds

In the theoretical field, the theory of flutter at supersonic airspeeds is being studied and charts worked out which will enable reasonably rapid commutations to be made of the flutter tendencies in this speed range.

Additional flutter programs are planned. These will include extending transonic and supersonic experimental model investigations for bendingtorsion to include the aileron instabilities not encountered in the supersonic speed ranges will also be investigated at such speeds.

Several experimental projects are now under way to measure the periodic loads due to landing, gunfire, and gust impacts in existent aircraft which are most typical or representative of future design trends. The data so obtained is to be used in establishing aircraft design criteria for comparison with those predicted by theory. Both theoretical methods and experimental studies along present lines will be used in planned future research.

#### Aluminum-Faced Sandwich Wings

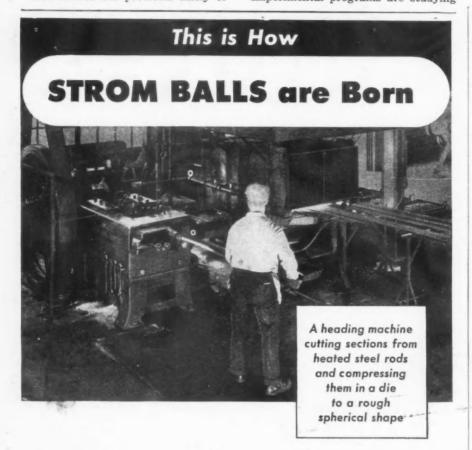
Current projects concerning development of aircraft structures include aluminum-faced sandwich wing structure for the P-80, tapered skin aluminum alloy structures, structural adhesives, magnesium covering for surfaces of highspeed aircraft, and effects of temperature rise due to aerodynamic heating on structural members. Research will also continue in the field of non-metallic materials such as plastics and woods.

It is hoped that the programs now under way and those to be started next fiscal year will lead to development of structural components which will be capable of supporting the loads of highspeed craft at high temperature and for the length of time required. In addition to the search for a non-metallic structural component suitable for supersonic craft and guided missiles, the U.S.A.F. expects to give serious attention to development of sheet material which will have improved properties at temperatures of 1800 F and higher.

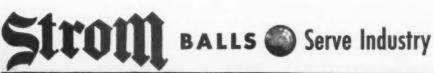
#### Titanium-Zirconium Alloys

Other work planned for the Fiscal Year 1949 and succeeding years includes continued investigation into use of titanium and zirconium alloys with respect to possible application to aircraft construction, continuation of efforts to develop new high temperature aluminum alloys and high

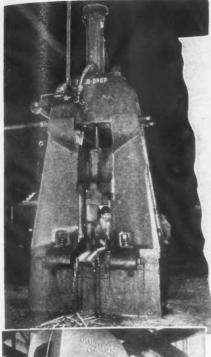
(Turn to page 272, please)



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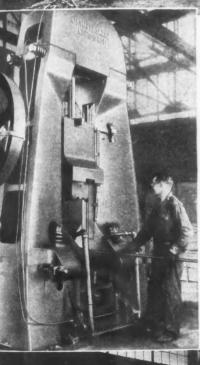
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The statement that the Ceco-Drop makes other gravity drop hammers obsolete may have seemed over-enthusiastic a year ago when this new hammer was introduced. But the experience of forge shops which have installed Ceco-Drops—and ordered more—is the best evidence that the statement is simple truth. As the facts are known, the list keeps growing.

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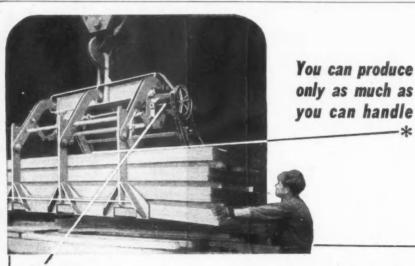




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CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

# Air Force

(Continued from page 270) strength wrought magnesium alloys, and evaluation of martempering and its heat-treating processes for steel.

Obviously enough, power problems in research and development are related closely to the foregoing program-that is, development of heatresistant materials. Future work in the field of reciprocating engines, officials say, will be directed only toward development of such power for trainer, helicopter and accessory engines only. On the other hand, emphasis will be given to developing gas turbine motors of higher output with greater internal efficiencies and with improved components of construction.

Three Major Problems

Three major problems face the developers -- combustion, construction materials, and design. As in the instance of structural materials, this program will continue the search for high temperature resisting metals or ceramic metal bodies. These must possess the physical properties suitable for application to the construction of turbine blades and other components of the engine which are exposed to excessive heat or high temperatures.

Considerable work is under way in the field of ceramics, despite the continuing research for better alloys. The object is to develop materials which may be utilized for replacement of alloys used in high temperature areas of aircraft power plants. Already ceramic coatings have been developed which maintain adherence to metals and which prolong the life of metal parts exposed to high temperature. Work will continue to be conducted into development of solid body ceramics for application as gas turbine parts and for use in rocket motors and combustion chambers and noz-

"New materials and new methods of installing and arranging components with respect to each other must be found," Air Force officials say, "if the research and development program is to result in any marked improvements in the near future over present types of jet propulsion en-

**Turbine Blade Attachment** 

Some of the major design problems, it was explained, concern methods of attaching blades to the turbine disc, the question of main bearings which must operate at speeds of 10,000 to 20,000 rpm, of determining the best materials for use throughout the engine, and the improvement of efficiency of components such as the compressor and turbine.

At present, the Air Force is directing its efforts toward development of turbo-jet engines which vary in size and output from 3275 lb thrust at take-off and a minimum specific fuel consumption of 1.16 lb of fuel per lbthrust per cruising, to 20,000 lb (Turn to page 274, please)

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If you are faced with problems in the transmission of power, call on Foote Bros. Our engineers will assist in the development of gears and gear units to meet any need.

Precision Gears: Foote Bros, "A-Q" (aircraft quality) Gears permit high loading coupled with light weight. They bring new standards of speed, compactness, low noise level, and, above all, assure an efficiency that marks a new advance in gear design.

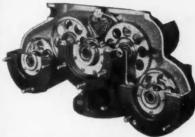
Commercial Gears: Complete facilities backed by nearly a century of experience are available for the production of high quality spur, worm, helical, bevel and internal gears-any size-any quantity.

Power Units and Actuators: These units are individually engineered to solve many problems of power application and control. They may be designed to fit a confined space envelope, will operate on an exact time cycle and offer the advantages of high speed operation where desired.

Speed Reducers: For years, manufacturers have relied on Foote Bros. for speed reducers for all types of commercial applications. The complete line includes helical gear and worm gear reducers in a wide range of sizes and ratios.

The Hi-Hat vertical shaft speed reducer provides greater span between bearings and rigidity for the extended shaft. Upper bearing is positively lubricated.





Accessory Drive on a Turbo Jet engine. Power is transferred from the engine shaft through a spiral bevel and spur gear reduction system.



Power Unit on the Northrop YB-49 Flying Wing Bomber. This unit is part of the Elevon Control System required to maneuver the airplane.



This large gear, twenty feet in diameter, was produced by Foote Bros. to drive a ball mill. It typifies the facilities of this company to manufacture gears of exceptional size.

> An unusual pair of "A-Q" Gears manufactured for the largest propeller in service—the Curtiss C636S. A limited space envelope and the demands for light weight require gears of extremely thin sections. Despite this, they must carry heavy loads.



Better Power Transmission Through Better Bears FOOTE BROS. GEAR AND MACHINE CORPORATION Dept. F 4545 South Western Boulevard . Chicago 9, Illinois

WRITE FOR BULLETINS

Three engineering bulletins are They are: (1) "Whatever Your Needs in Quality Gears"; (2) "Aircraft Quality Gears" and (3) "Foote Bros. Power Units." If you have not received copies, write for them.

# Air Force

(Continued from page 272)

thrust at take-off with a minimum specific fuel consumption of 0.89 lb of fuel per lb-thrust per cruising.

Likewise, present goals in respect to turbo-prop engines are the development of engines which vary in size and output from the present 1700 equivalent bhp at take-off with a minimum specific fuel consumption of 0.49 lb of fuel per ebhp per hr at cruising to 10,000 ebhp at take-off with a minimum specific fuel con-

sumption of 0.39 lb of fuel per ebhp per hr at cruising.

In the field of ram jet engine development, efforts are being directed toward development and operation of a supersonic ram jet. To this end, it is admitted, considerable theoretical and laboratory research study will be required before fundamental ram jet components designs, combustion processes, and construction materials can be determined.

For the present, it is said, little emphasis will be given to new developments in the helicopter or rotary wing field as such other than to improve existing types. It is felt that the liaison and utility cargo rotaries (rescue types) now developed will meet most requirements; it is expected that the small types will continue to be developed commercially.

The main problem in this category, as the Air Force sees it, is continued improvement in design and development of fabrication of large rotors and of blade control methods. Several projects are under way for improving resistance to vibration, both by surface treatment and improved design.

#### Stainless Steel Rotor Blades

Stainless steel rotor blades are being developed for general helicopter use; these have been placed in service for testing and indications are that the performance is superior to the conventional wood blades. Also under way is development of a 90-ft rotor for use on a large cargo type helicopter; this includes the blades, hub, and necessary controls.

Perhaps the most radical departure from standard systems is research looking into development of a 20-ft jet rotor system. The blades are to incorporate internal ducts through which air delivered to the rotor hub from the compressor will travel to a pressure type jet unit mounted at the blade tips. Another project of this type concerns development of a 16-ft rotor system powered by ram jet thermal engines also mounted on the blade tips.

Present technical knowledge in the field of liquid propellants is admittedly limited and in its early stages. Making use of information obtained through study of the German V-2 and the ME-163 power plants, however, in the field of liquid and propulsion rockets attention will be directed toward refinement and perfection of usable rocket engines under all operating conditions. Much of the present program will center on improvement of such component parts as have proved efficient and reliable.

#### Nuclear Energy Research

Research and theoretical studies in the field of nuclear energy with an eye to possible application of atomic energy to aircraft propulsion is understandably cloaked in secrecy. This line of research, however, is being conducted by the NEPA division of the Fairchild Engine & Airplane Engine Corporation in cooperation with the Atomic Energy Commission. Needless to say, this work will be continued next year and in succeeding years.



# there's a **DETREX** machine for Every METAL-CLEANING APPLICATION

DETREX builds all sizes of hand-operated and conveyorized degreasers and washers for cleaning every kind of metal parts . . . ranging from needles to auto bodies — and with any production volume desired. Work handled includes castings, forgings, tubing, wire and stampings — both of ferrous and non-ferrous metals.

For most jobs, standard Detrex machines provide top speed and economy, either used "as is" or with minor modifications. For the really unusual jobs, special machines are designed and built to assure the same top efficiency.

Detrex also supplies the solvent or cleaning

compound needed to obtain maximum performance from each machine and top efficiency on every metal-cleaning application. In all cases, the machines and cleaning compounds are backed by a nationwide field organization. Consult your Detrex field representative.





Special Detrex high-production degreasing installation.

Degreasing Machines and Safety Solvents • Metal Parts Washers • Alkali and Emulsion Cleaners and Strippers • Processing Equipment • Spray Booth Compounds





Style 6RK (and opposite hand 3RK) have cylindrical inserts that can be indexed several times, then turned end end and used for a second cycle of cutting before regrinding. When both ends become dull, they are reground, and are then ready for another double cycle of cutting. The inserts can be reground many times.

STYLE ARK

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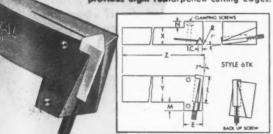
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Style 125K (and opposite hand 115K) have square inserts, indexable four times on each end. Ends can be reground many times and each double-end regrind provides eight resharpened cutting edges.



Style 6TK (and opposite hand 3TK) have triangular inserts, indexable three times on each end. Ends can be reground many times—and each double-end regrind provides six resharpened cutting edges.

#### Solid, Mechanically-Held Kennametal Inserts

Inserts are mechanically-held, vertically-best use is made of high compressive strength of Kennametal (up to 800,000 PSI); brazing strains are eliminated.

#### Indexable Cutting Edges

Can be indexed 6 to 12 times before regrinding. Indexing is a simple operation, and does not require changing tool holder.

#### Replaceable Inserts

Few standard sizes can be used in a variety of tools and jobs-simplifies tool control; reduces toolroom stocks.

#### Simplified Regrinding

Resharpening merely requires squaring off both ends of insert, and grinding chip breaker if requiredreduces load and confusion in grinding room.

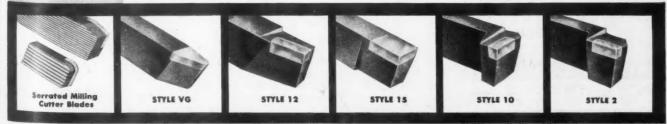
#### **Permanent Setting**

Insert can be indexed or changed without changing tool holder setting-less set-up and machine down time.

The overall result of Kennamatic tooling is that higher production rates can be reached, and maintained, at much less cost. Let our engineers suggest suitable applications.



KENNAMETAL Suc., LATROBE, PA.



#### AVOID COSTLY SHUTDOWNS DUE TO CORROSION ...



SPECIFY

# HAVEG

EQUIPMENT FOR

CORROSION RESISTANCE THAT'S MORE THAN SKIN DEEP

- Agitators
- Baskets
- Blowers
- Fume Duct
- Filters
- Kettles
- · Piping
- · Pumps
- · Tanks
- Towers
- Many Others

HAVEG is a molded structural material that is completely acid and alkali resistant throughout its entire mass . . . it is not a lining nor a coating!

Large size equipment can be molded at low cost in one piece without seams or joints and installation accomplished easily and economically.



Send for Bulletin F-5 for complete design, engineering and application



# **AUTOMOTIVE INDUSTRIES**

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### **Leading Plants**

in the

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#### Do Americans Want A Small Light Car?

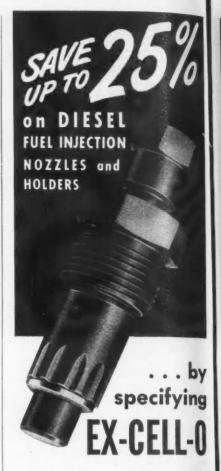
By Edward R. Grace, Vice-Pres. Grant Advertising, Inc.

NATION-WIDE survey made during December in 16 cities across the nation provided a net conclusion that should definitely register the intensity of the interest of the public in a smaller, lighter car.

A total of 1619 car drivers were interviewed. More than 2000 calls were made in order to obtain this many respondents who drive a car. Calls were made in all income groups: A income (\$5000 or over annually); B income (\$3000 to \$5000); C income (\$1500 to \$3000); and D income (below \$1500). The following age breakdown was used as based on census figures from the U.S. Bureau of Census: under 30 (31 per cent); 30-40 (27 per cent); 40-50 (23 per cent); over 50 (19 per cent). About 75 per cent of the calls were made to men and 25 per cent to women.

More than half of the persons interviewed, a national percentage of 60.4, said they believed the leading

(Turn to page 278, please)



It's true. You can cut engine costs and eliminate field service problems . . . simply by specifying EX-CELL-O Diesel Fuel Injection Nozzles and Holders. They are outwardly opening, differential type pintle nozzles designed to give you maximum efficiency from high speed Diesel engines of 5 to 300 H.P. Installation? Simple. No drain lines required, no adjustments necessary. Each unit selfcontained, factory calibrated and sealed. Cost? Approximately 25% less than any other nozzle on the

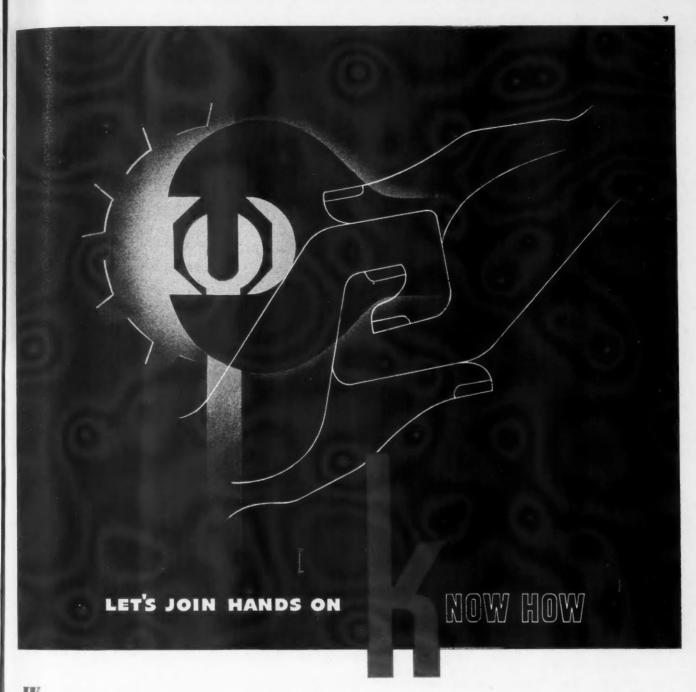
Replaceable Nozzle Tip Cross-sectional view shows simplicity of design. Only 3 working parts.



Write today for this booklet containing complete information.

Fuel. Injection Division

EX-CELL-O CORPORATION 1200 Oakman Blvd. · Detroit 6, Mich.



What you know about your business . . . and what we know about equipment\* . . . may be the happy combination to solve your sales or manufacturing problem. Why not investigate AC's wide assortment of standard or special equipment units? You'll not only find variety, but flexibility, too . . . born of 40 years of development work on many types of products. Your inquiries are solicited.

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\*AIRCRAFT SPARK PLUGS - AIR CLEANERS - AMMETERS CARBURETOR INTAKE SILENCERS - CARBURETOR INTAKE SILENCERS - AMD AIR CLEANERS - CRANKCASE BREATHERS CRANKCASE VENTILATION VALVES - DIE CASTINGS - DIE CASTING MACHINES - BACK FIRE DEFLECTORS - FLEXIBLE SHAFF TASSEMBLIES - FUEL OUI, FILTERS - FUEL PUMPS FUEL AND VACUUM PUMPS - GASOLINE GAUGES - GASOLINE STRAINERS - ICHITTON CABLE TERMINALS - INSTRUMENT PANELS - LUBRICATING OUI, FILTERS - OUI, FILTER REPLACEMENT LEMENTS - AND CARTRIDGES - AIR GAUGES OUI, GAUGES - RADIATOR PRESSURE CAPS - REPLACEABLE AIR CLEANER ELEMENTS - AUTOMOTIVE SPARK PLUGS SPARK PLUG GENERS - SPEEDOMETERS - SPEEDOMETER AND TACHOMETER DRIVE ADAPTERS - TACHOMETER AND TACHOMETER DRIVE ADAPTERS - VOLTMETERS THERMO GAUGES - VACUUM PUMPS - VOLTMETERS THERMO GAUGES - VACUUM PUMPS - VOLTMETERS

#### K-F Moves Door Panel Work to Budd & Fleetwings

Kaiser-Frazer Corp. is moving its door panel business from Hayes Mfg. Corp. at Grand Rapids to Budd Mfg. Co. and to Fleetwings, Inc., of Bristol, Pa. It is expected that the change will be made early this summer. Each company will get about half of the K-F door business. They will furnish K-F with the fabricated door including hardware, but K-F will do the metal finishing, bonderizing, trimming, and painting.

#### Use More Foam Rubber for Seat Cushions

Increased use of foam rubber for automobile seat cushions is reported by manufacturers of that product. They say that its use has been rising steadily since its introduction on prewar cars. Several companies are already including foam rubber cushions as standard equipment and with others it is optional. With the increased use in the middle and higher priced brackets, production is increasing and it is expected eventually to be used in all cars.

#### Small Light Car

(Continued from page 276)

motor car manufacturers should produce a smaller, lighter car in addition to their present models. There does not seem to be any great difference in opinions of the men or women interviewed about production of this car. Neither is there any noticeable difference in the younger or older age groups. This would seem to show that this type of automobile would be equally acceptable to a man or woman and whether "under 30" or over.

Almost three fourths of the persons interviewed, or an average of 72.7 per cent who said the manufacturers should produce this smaller, lighter car, said they would buy one in preference to the present lowest priced cars. Again, man, woman or age groups seems to make no difference. Ti

Of the people who said they would buy one of these smaller cars in preference to the present lowest priced cars, 67 per cent would buy it as a first (or only) car while 32 per cent would buy it in addition to another car.

The top reason given for buying this smaller car seems to be "lower price" with "lower mantenance" second and "greater driving convenience" third.

From the majority of the persons interviewed who said they would buy a smaller, lighter car in preference to the lowest priced car now available, the following picture of the new car they desire is obtained:

50.4 per cent desire a utility vehicle.
49.6 per cent desire that the smaller car be smartly styled and more luxurious.
61.2 per cent are willing to pay from \$750 to \$1000 for this car.
16.5 per cent are willing to pay more than \$1000.

\$1000. 17.5 per cent want to pay less than \$750. 59.2 per cent desire a six-cylinder engine. 27.7 per cent prefer only four cylinders. 6.3 per cent expressed a desire for eight cylinders.

20.8 per cent desire a car with from 70 to

20.3 per cent desire 85 to 90 hp.
20.3 per cent want more than 90 hp.
14.6 per cent want more than 90 hp.
39.2 per cent said they want to get 20 to 25 mpg. 34,2 per cent want to get from 25 to 30

34,2 per cent want to get from 25 to 30 mpg.
46 per cent said they preferred a wheelbase of from 90 to 115 in.
21.5 per cent want a wheelbase of from 116 to 120 in.

24.6 per cent didn't know what wheelbase would be preferable.
48.4 per cent said they wanted a top speed of 65 to 80 mph.
37.7 per cent preferred a top speed of from 45 to 60 mph.

39.5 per cent said they wanted a cruising speed of from 30 to 40 mph.

36.1 per cent preferred a cruising speed of from 45 to 50 mph.

33.5 per cent said they wanted a two-door model.

model.

30.9 per cent preferred a four-door model.

17.3 per cent said they wanted a coupe.

11 per cent preferred a convertible.

7.3 per cent expressed a desire for a station wagon body type.

62.2 per cent said they preferred a front seat for two persons.

37.5 per cent wanted a front seat big enough for three persons.

65.5 per cent wanter a rear seat big enough for three persons.

The foregoing was abstracted from the paper presented by Mr. Grace at the recent SAE 1948 annual meeting in Detroit.

# ARE YOU WASTING DOLLARS

Fancy

# **SPRING SPECIFICATIONS?**

THERE'S an easy way to keep spring costs from getting out of hand. You simply eliminate "luxury" springs. A careful study of spring requirements often reveals no need for such costly complexities as "fancy" ends, unnecessary grinding, "beautiful" materials and finishes, extremely close tolerances or unique designs.

You would be surprised at the thousands of dollars that Lewis Spring engineers have saved manufacturers — just by recommending and supplying the most practical and simple spring or wireform for the specific job. Lewis engineers, being familiar with all phases of spring design and manufacture, have a breadth of experience that well qualifies them to judge the spring and wire form type, size and style that will suit the purpose best at the lowest cost.

Why not get a spring check-up for YOUR products? There is a Lewis engineer near you who will be glad to analyze your spring requirements with an eye toward saving your money. There's no obligation.

> LEWIS SPRING & MANUFACTURING COMPANY 2644 WEST NORTH AVENUE **CHICAGO 47. ILLINOIS**



Temperature control?

Pressure control?

Sealing against leakage?

Flexible joints?

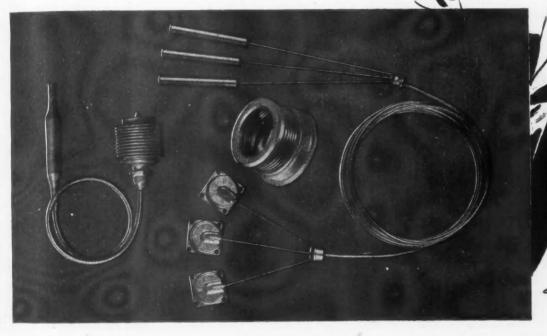
Which of these

## **DESIGN PROBLEMS**

is puzzling you now?

Transmitting motion to remote points?

Packless valves?





Why wonder how bellows assemblies can do your job? It's easy to know for sure. Let our engineering department analyze *your* problem, as they have done in many other cases, and design a bellows assembly that will fit your exact

requirements. Send sketches and specifications. CLIFFORD MANUFACTURING COMPANY, 563 E. FIRST ST., BOSTON 27, MASS. Offices in Detroit, Chicago and Los Angeles. First with the Facts on Hydraulically Formed Bellows.

# CLIFFORD



#### HYDRAULICALLY-FORMED BELLOWS

ALL-ALUMINUM OIL COOLERS





nstrumen Bellows



Aircraft Bellows Assembly



Steam Tra Bellows Assembly



Bellows Seal Assembly

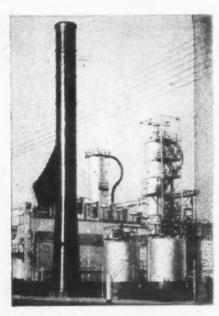


All-Aluminum Cylindrical Oil Cooler



All-Aluminum Oval Oil Cooler

# FOR THE WORLD'S LARGEST Petroleum PRODUCERS



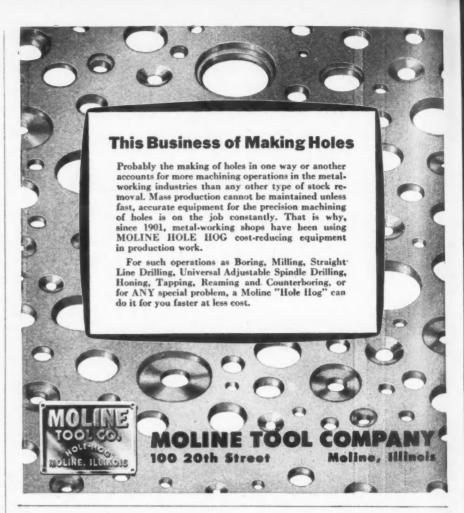
THERE are more Layne well water systems serving petroleum producers and refineries, than all other makes combined! And this same overwhelming preference is true with just about every major industry in the Nation. With petroleum producers now using more water than ever before, their Layne well water systems are paying handsome dividends in giving absolutely dependable high peak production.

First of all, Layne well water systems and Layne vertical turbine pumps have always been noted for their superior engineering features. Next, they have always been manufactured from the finest materials available. And last, but very important, they are always installed according to Layne's exclusive standards. The results have been—more water, lower operation cost and longer life.

All of this adds up to the fact that for any situation demanding large quantities of well water at the ultimate in low cost, there is no equal to a Layne well water system. For imprature address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.



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#### Current Automotive Patents Issued

Clarence Regulating Device for Internal Combustion Engine Valves, Otta M. Burkhardt, Cleveland, Ohio. (2,433,089).

Power Plant for Helicopters. Archibald Graham Forsyth, assignor to The Fairey Aviation Co., Ltd., Hayes, Middlesex, England. (2,433,107).

Two-Cycle Gas Engine, Hewitt A. Gehres, assignor to Cooper-Bessemer Corp., Mount Vernon, Ohio. (2,433,111).

Tandem Axle Running Gear for Transportation Vehicles. John Paul Fellabaum, Dayton, Ohio. (2,433,268).

Electric Fuel Heater for Internal-Combustion Engines. Gustav H. Kruschke, Camp Douglas, Wis. (2,433,374).

Automatic Cylinder Drainage System for Internal-Combustion Engines, Ralph J. Furstoss, Stanley J. Kranc and Paul V. McWherter, Peoria, Ill., assignors to Caterpillar Tractor Co., San Leandro, Calif. (2,433,447).

Cooling Device for the Oil Systems of Internal-Combustion Engines. William Ernest Green and William Frederick Forrest Marti-Hurst, Sunbury-on-Thames, England. (2,433,-451).

Electric Spark Ignition System for Internal-Combustion Engines. John Andrew Laird, assignor to Joseph Lucas Limited, Birmingham, England. (2,433,462).

Polarized Headlighting System for Automotive Vehicles. Clinton J. T. Young, assignor to Polaroid Corp., Cambridge, Mass. (2,433,-503).

Fluid Fuel Internal-Combustion Air Heater, Henry J. De N. McCollum, assignor to Stewart-Warner Corp., Chicago, Ill. (2,433,-618).

Adjustable Combustion Chamber for Internal-Combustion Engines. John Melvin Woodruff and Jesse Alvin Woodruff, Tremonton, Utah. (2,433,639). Aircraft with Pusher Type Propeller for Stabilizing and Steering. Arthur M. Young, Buffalo, N. Y. (2,433,641).

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Aircraft Control Surfaces for New Control. Cloyd P. Clevenger and Walton Clevenger, Miami, Fla. (2,433,649).

Ignition System. Reginald T. Coe, Rugby, Thomas F. Robinson, Kenilworth and Douglas F. Welch, Rugby, England, assignors to General Electric Co. (2,453,650).

Fuel Pump. George Hantjopoulos, New York, N. Y. (2,433,664).

Wheel Mount for Aircraft Landing Gears. Eric Parkinson, New York, N. Y. (2,433,706).

Diesel Fuel Oils. Herschel G. Smith, Wallingford, Troy L. Cantrell, and Mark L. Hill, Yeadon, Pa., assignors to Gulf Oil Corp., Pittsburgh, Pa. (2,433,716).

Method of Fuel Combustion. Arthur J. Stosick, assignor to Aerojet Engineering Corp., Azusa, Calif. (2,433,932).

Internal-Combustion Engine. John Stucke, Phila., Pa. (2,433,933).

Operation of Jet Propulsion Motors with Nitroparaffin. Fritz Zwicky, Frederick J. Ewing, James M. Carter and Arthur J. Stosick, assignors to Aerojet Engineering Corp., Azusa, Calif. (2,433,943).

Apparatus for Supplying Liquid Fuel and Air to Variable-Speed Internal-Combustion. Herman G. Rausenberger, Yonkers, N. Y., assignor of one-half to Howard Murphy, Glen Ridge, N. J. (2,433,958).

Fuel Injector. Nicholas Fodor, Wilmette, Ill. (2,433,985).

Controllable Pitch Propeller Mechanism. Gordon W. Hardy, assignor to The Marquette Metal Products Co., Cleveland, Ohio. (2,433,990).

The foregoing patents were compiled from latest issues of the OFFICIAL GAZETTE of the U.S. Patent Office. Copies of the individual patents may be obtained from the Commissioner of Patents, Washington, D. C., at a cost of 25 cents each. The number of each vatent is given in parenthesis.

# **Builds Better Bodies at** Lower Cost WITH EXPLOSIVE RIVETS

Custom Truck Body Builder Lists Advantages of These High-Speed Fasteners

"We're proud of our truck bodies, and Du Pont Explosive Rivets help us build them to stand hard usage with little or no maintenance," recently stated Thomas A. Monahan, president, Providence Body Company, custom truck-body builders in Providence, R. I.

"We tried various types of fasteners but Explosive Rivets proved easier to use and more satisfactory. They require no costly equipment ... no extra power ... and we now use these versatile fasteners for 90% of the fastening jobs on our panel truck bodies. In addition, Explosive Rivets reduce our fastener inventory."

Explosive Rivets save time . . . cut costs . . . make fastening jobs easier in scores of truck, trailer and bus body plants. Can you use them? Our engineers will help you determine that. Write, briefly describing your fastening operations. Ask for booklet B-85.

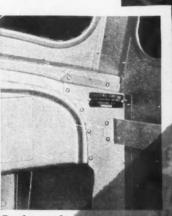
E. I. DU PONT DE NEMOURS & CO. (INC.) EXPLOSIVES DEPARTMENT WILMINGTON 98, DELAWARE



Quick job attaching metal kick plate to tail board with Explosive Rivets. Note also that they secure door hinges and stringers. Rivets are one-piece fasteners and make strong, tight joints that can't vibrate loose.



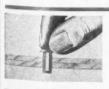
Easy-to-use, light-weight, electrically heated Riveting Iron sets Explosive Rivets in less than 2 seconds . . . saving this builder from 7 to 8 hours in assembling each truck roof. More than 700 Explosive Rivets of brass are used per truck.



Dash panel, support, and wind shield frame are quickly ass bled with Explosive Rivers. Even name plates are these versatile fast that neat and smooth Rivets heads require no additional finishing operation.



Simple matter...using Explosive Rivets to secure interior sheathing of panel truck roof. Portable Riveting Iron operates on 110-volt current and can readily be moved from job to job. Simplifies both open work and blind fastening.



J.

#### Easy to use

1. Insert Rivet in prepared hole. 2. Touch tip of Riveting Iron to head of Rivet. Heat fires minute charge in Rivet shank. Shank expands . . . fills hole completely. Barrel-shaped head

locks Rivet securely in place.



A Product of Du Pont Explosives Research







BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

## Widespread Use of Nickel Alloys in the Automotive Industries

Presented herein is an overall picture of the present trends in nickel alloys. Prepared by the staff of the development and research division of the International Nickel Co., Inc., this article describes the widespread uses of the many nickel alloys, summarizes present consumption and production, predicts future demands, and discusses research work now in progress.

Reduce Assembly Time

# MULTIPLE BREAKER INSTALLATIONS IN MANY COMBINATIONS NOW POSSIBLE

The dimples in the mount and circuit breaker case shown in the magnified view give the snap-action. Circuit breakers snap into the mount securely and quickly, by *finger pressure*. No spot welding. No screws. No tools needed. *And*, if desired, the mount can be attached to the car body . . . the circuit breakers assembled on the wiring harness, and

snapped into the mount when the car is wired. Write for further information, or phone our Detroit office, 6432 Cass Avenue, Detroit 2, Michigan, Phone Madison 6300.



Safeguard Operation of Automotive Electrical Equipment Instantly

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... Automatically . . . from Dangerous Overloads or Short Circuits. /

F. A. SMITH MANUFACTURING CO., INC., ROCHESTER 2, N. Y.

Electrical Engineering and Manufacturing Serving the Automotive Field Since 1922

HEAVY demand persisted in 1947 for alloys of all types containing nickel to satisfy the needs of the metal industry in which high production has been the keynote. A number or trends were observable which reflected the increasingly exacting demands of industry for better performance from all kinds of equipment, tools, and appliances.

#### Alloy Steels

Widespread use of alloy steels containing nickel has continued throughout the year. The railroad industry has been particularly prominent in using low-alloy high-strength structural steel to save weight on new rolling stock, by taking advantage of the improved strength, abrasion resistance and resistance to corrosion offered by these steels in the roller condition. Most of the high-strength steels employ nickel in amounts ranging from about 1/2 to two per cent, are readily cold formed and welded, and find extensive use in transportation equipment and other applications in which weight saving is an important consideration.

Engineering grades of triple alloy steels containing nickel, chromium and molybdenum are also being widely employed. Aircraft manufacturers have shown preference towards the use of nickel-chromium-molybdenum steel tubing for engine frames in which high strength plus ready formability and weldability are important considerations.

Triple alloy steels of both carburizing and direct hardening grades have been almost exclusively adopted by the tractor industry for all highly stressed applications; the automotive and machine tool industries are also prominent users. A considerable market has developed for hot coiled and leaf springs because of the higher quality surface conditions and superior toughness obtainable with triple alloy steels containing from 0.50 to 0.65 per cent carbon. The American Iron and Steel Institute during the year established as one of its strandard alloy steels, a free-machining varitey of low alloy triple alloy steel, known as 8641. It is especially well suited for automatic screw products and combines a high degree of machinability with the good properties of alloy steels.

One of the largest consumers of nickel-containing steels has been the automotive truck and bus industry where the demands for high strength and toughness require the use of various heavily alloyed steels containing combinations of nickel and molybdenum, and nickel, chromium and molybdenum.

(Turn to page 284, please)

# New TELEGAGES incorporate SIGNIFICANT /MPROVEMENTS

King-Seeley automotive dashboard instruments have been under continuous engineering study for 15 years, during which time many improvements have been incorporated. Now additional refinements are being added. Heretofore, the indicating pointer of receiving instruments had a total swing of 45 degrees, but now a new pointer suspension has increased this to 70 degrees. This suspension together with a redesigned pointer provides smoother action, permits a larger

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STRIES

dial where desired and greatly improves the instruments readability.

A new metallurgical development applied to the contacts of the sending instrument increases its service life, assures steadier readings, and generally improves its op-

Induction soldering of critical diaphragm eration. assemblies provides greater uniformity and increased durability.



March 15, 1948

#### "The Outstanding Basic Improvement in FLEXIBLE SHAFT Machinery in 25 Years"

The NEW Strand Rotoflex 4-speed gear drive Flexible Shaft Machine (shown upper right) is another step forward in Strand quality precision tools for faster, easier, more economical production work. The Rotoflex 4-speed gear drive employs a patented, new type of quick change gear drive utilizing 4 positive speeds by a unique and easy method of instantly changing from one speed to another. Rotoflex machines are powered with totally enclosed ball-bearing motors having speeds from 850 to 9000 R.P.M., depending on motor.

Standard type Strand machines, (lower right) give portable rotary power at constant speeds with dependable results in all grinding, buffing, drilling, wire brushing and rotary filing operations. Hundreds of types and models from 1/4 to 3 H.P. available with suitable attachments for your specific requirements.

> Distributors in all principal cities Ask for Bulletin No. 43 and Catalog No. 30



BLE SHAFTS

N. A. STRAND & CO. 5002 NO. WOLCOTT AVE. CHICAGO 40, ILL.

(Continued from page 282)

Recently developed low carbon high nickel steel, containing 81/2 per cent nickel, shows considerable promise for use in the petroleum industry for sucker rods and drill pipe. The excellent mechanical properties developed by this steel in the normalized and drawn condition also are of advantage in this application. Another important trend in the petroleum industry has been the use of relatively high alloyed steels for drill pipe operating in deep wells. The long strings of rod which must be handled in such wells require the use of nickel-containing steels which develop high tensile strength when heat treated by normalizing and drawing.

Piston rods of drop forging steam hammers sometimes have given short life because of the exceptionally severe impact and vibrational stresses imposed in service. In one case lowcarbon 31/2 per cent nickel-molybdenum steel, oil quenched and tempered to the hardness of 200 Brinell, improved the average life from one week to over 200 days.

Cast alloy steels containing nickel are extensively used in railroad equipment, steel mill equipment, excavating machinery and similar fields in which strength in heavy sections and toughness are requisite. They are in

(Turn to page 286, please)

#### **CONVOY TOTE BOXES**

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NO MAINTENANCE-Convoy Tote Boxes are so inexpensive that they can be discarded when they finally become unserviceable.

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CONVOY, INC . CANTON 7, OHIO

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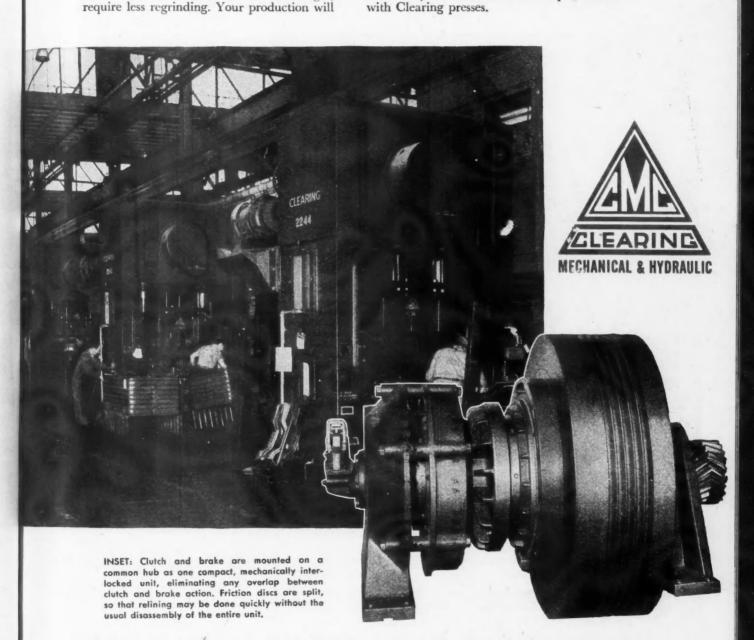


You can usually save a lot of money by producing parts on a press rather than by other means—but don't let that saving blind you to the

possibility of further economy after you've chosen press methods.

When you put your job on the proper Clearing press, you will be making the most of a better method. Your dies will last longer, be speeded by fewer interruptions for servicing either dies or press. And when such service is needed, it will consume less precious time because Clearing engineers know the cost of down-time and have planned to hold it to a minimum.

These are cold, hard facts, and we have convincing proof which we would like to show you. It costs you nothing to consult us about ways to more economical production with Clearing presses.



CLEARING MACHINE CORPORATION • 6499 W. 65th St., Chicago 38, Ill.

CLEAR THE WAY TO CEPCIENT MASS PRODUCTION



#### **Nickel Alloys**

(Continued from page 284)

substantial use in applications subject to both low and high temperature service. Low-alloy nickel-chromium-molybdenum cast steels are finding considerable use for parts operating at 950 to 1000 F, not only because of their strength but because of their resistance to deterioration by graphitization over long periods of time at these temperatures. For applications involving exposure at subzero temperatures, castings containing about  $3\frac{1}{2}$  to four per cent nickel

with less than 0.15 per cent carbon, are generally employed to avoid the brittle behavior which often characterizes other steels at low temperatures.

#### Stainless Steels

The high volume of production of stainless steels achieved during the war years has continued in the postwar period. Ingot production of over 500,000 tons was reached in each of the years 1945 and 1946. Based on the present outlook equally high volume, or more, is predicted for the year 1947.

Industry looks forward to further expansion in volume and scope of uses in the future, and is continuing its research and development activities to provide a better knowledge of fabricating procedures and a broader consumer appreciation of the economies offered by the stainless steels in terms of lowered costs of maintenance, repairs and replacements. Among the specific industries in which the use of these steels is said to show substantial growth are air-conditioning, architectural the and structural, automotive and truck. heating, plumbing, chemical, paper and pulp, textile, marine petroleum and the food and beverage fields. The aircraft industry, where stainless and heat resisting steels are essential in connection with the development of jet and gas turbine engines, expects to utilize stainless steels in substantial quantities.

#### Nickel and High Nickel Alloys

The varied and versatile properties of nickel and the high nickel alloys, such as Monel and Inconel, are influencing their uses for many purposes involved in current advances of the various branches of science, including chemistry, aeronautics, electronics and medicine.

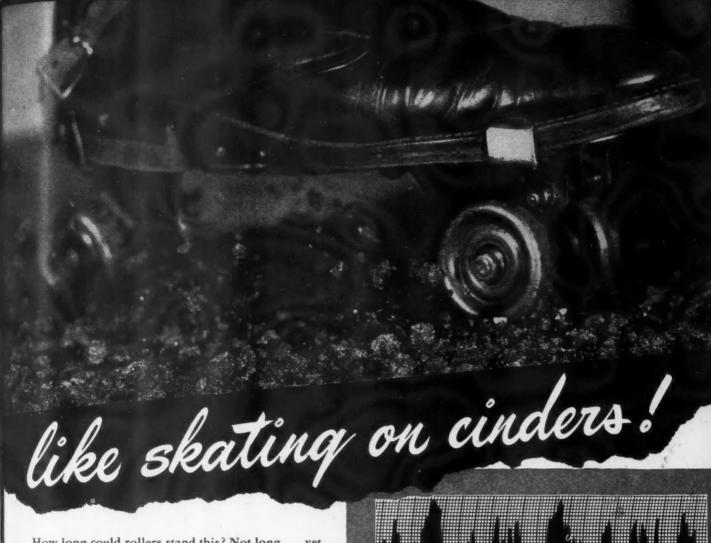
Widest use of these alloys continued to be found in the power, chemical and associated fields where new and higher standards of operating and production efficiency are forcing greater demands upon equip-These demands include increased resistance to high temperatures and pressures and to new and more powerful agents of corrosion, such as fluorine, the industrial uses of which are just beginning to be explored. Of particular importance is the use of such alloys in the development of methods for the production of gasoline and fuel oil from natural gas. Ability to stand up under excessively high temperatures continued to make Inconel an important material for jet engines.

Some of the high strength alloys, such as heat-treated "K" Monel, are aiding in the deep-well drilling for petroleum, now a major project of the oil industry. Being non-magnetic and highly resistant to corrosion, this alloy is being used for instruments as well as for actual drilling and control equipment. Producers have shown particular interest in the material because of its ability to aid in the maintenance of production levels in highly corrosive fields.

In the field of accessories, industries facing corrosion problems are turning to Monel fastenings—such as hollow, self-plugging rivets for blind working, and nails with annular grooves to give the holding power of screws. A special type of fabricated tubing, in both nickel and Monel, is finding uses throughout a score of industries — from beer dispensing

(Turn to page 290, please)





How long could rollers stand this? Not long ... yet bearings must stand this same kind of punishment with a typical "finished" surface.

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There it is, at the right, an actual profile of a normal ground surface as shown by the Brush Surface Analyzer. Look at those ups and downs, and you'll see why bearings wear out before their time.

Now look below at the Brush analysis of a Superfinished surface. Smooth? Yes, seven times as smooth as the usual ground surface! No grinder scratches, no feed spirals, no chatter marks, no fragmented metal.

Without such defects to rupture the protective film of oil, the life of a bearing has no limit. So it pays to know about Superfinishing . . . and Gisholt engineers are ready with the facts.

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NORMAL GROUND SURFACE AS IT APPEARS TO THE BRUSH SURFACE
ANALYZER. ROUGHNESS AMOUNTS TO 20 MICRO INCHES.

BRUSH ANALYSIS OF A SUPERFINISHED SURFACE

THE GENERAL PURPOSE SUPERFINISHER is a self-contained unit, simple to operate. Handles a wide variety of miscellaneous or production work. Also available — specialized machines for all requirements.

SHOWS A SMOOTHNESS OF 3 MICRO-INCHES.



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The chances are that R/M now has the friction material you are looking for, in either the high, low or medium friction range. If not, you will find at R/M exceptional facilities for developing new materials.

For more than 50 years R/M has been the biggest developer and manufacturer of brake and clutch materials in this STOP & GO business. In fact, most of the modern friction materials were originated in R/M plants. Nine out of ten American vehicles, and hundreds of thousands of machines, are now equipped with one or more R/M parts . . . brake linings or clutch facings; fan belts, hose, or other types of rubber products.

Working with R/M, you enjoy the pooled experience of four separate laboratories and engineering departments, plus the huge productive capacity of four plants. You can work with us on first rough drawings and figures, or on requirements for models already in production.

#### RAYBESTOS-MANHATTAN, INC.

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Factories:

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#### Nickel Alloys

(Continued from page 286)

units to chemical and food processing plants. In sports, there is a marked revival of interest in high strength, corrosion-resistant alloys. Cupwinners in all of the important motor boat races during the year were equipped with Monel propeller shafts.

Consumption of nickel in cast iron, particularly Ni-Hard for abrasion resistance and high nickel-bearing Ni-Resist for corrosion-resistance, expanded substantially. The use of abrasion resisting martensitic cast irons, known as Ni-Hard, containing 2.5 to 4.75 per cent nickel, has increased considerably and they are rendering excellent service in the mining industry where the material is used for grinding balls, mill liners, pump bodies and impellers, and for other components subject to severe abrasive wear.

Corrosion, heat and wear resisting austenitic cast irons, known as Ni-Resist, containing 15 to 36 per cent nickel, are finding greatly increased applications as cylinder liners and

valve guides for internal combustion engines, in chemical equipment, heavy duty commissary ranges, pipe, glass molds, and bolts. Low expansion wear resistant 35 per cent nickel cast iron is in increasing demand for precision machine tool and instrument parts.

#### **High Nickel Irons**

During the year a new magnetic alloy was announced which affords a maximum permeability of about 1 .-000,000 as compared to about 100. 000 for the best previously available material. The alloy, which contains 79 per cent nickel, already has been used in considerable quantities of apparatus supplied to the U.S. Navy. Its use in communication transformers has been found to permit a threefold increase in the range of frequencies transmitted. Interest in magnetic amplifiers and frequency multipliers using saturating nickel iron cores is growing rapidly.

#### Copper-Nickel Alloys

Cupro-nickel tubing alloys are firmly established in the marine industry. During the war practically the entire production of 70-30 cupro-nickel was consumed by the U. S. Navy in the heat exchangers and salt water lines of navel vessels. With the cessation of hostilities, these alloys became available to industry and steadily increasing successful applications are being made in the petroleum and power fields in addition to their continued use in the marine industry.

#### Nickel Plating

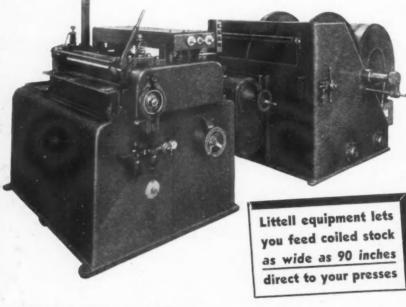
The record high rate of nickel anode production during 1946 included some refilling of tanks which had been depleted by war demands. The fact that the 1947 production will be higher than the 1946 record is a truer indication of the increase in the actual use of nickel for plating.

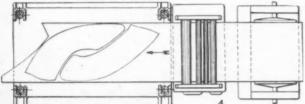
The automotive industries are still the leader in the use of nickel for plating purposes and is outstanding among a host of diversified fields. Almost all fields are showing either an increase or a favorable resumption of pre-war use. Preliminary examination of large-scale exposure tests by technical societies and specific tests by interested companies have reaffirmed the value of heavy nickel layers under chromium in atmospheric corrosion resistance. Partially as a result of this, heavier nickel plates are being used by the automotive industry on areas exposed to the atmospheric elements.

Nickel plating on aluminum is increasing in popularity as it becomes apparent that reliable adhesion and thorough coverage with heavy deposits can be obtained. Chromium on nickel plating of plastics is being done in considerable amounts. Applications

(Turn to page 292, please)

#### How to save in blanking and forming—





Left: see how fender blanks are nested for economy with Littell equipment.

G AIN tremendous savings. Use coiled stock in extra-wide sizes. With wide stock you nest irregular, awkwardly shaped blanks—reducing scrap losses. For example: auto makers save 12c to 15c per vehicle on stock alone, nesting fender blanks in this way. (See diagram.) Production rates per man-hour go up too.

Modernize your press room with Littell equipment. Littell has proved its leadership where it counts—out on the floor of actual factory press rooms. Today—write to Littell for complete details. REQUEST BULLETINS.

#### F. J. LITTELL MACHINE CO. 4127 Ravenswood Ave., Chicago 13, III.

Top: No. 6-38 Littell rack and pinion Feeding Machine, with No. C-100 Coil Cradle. Automatically straightens and feeds stock at desired feed length (0" to 74") and interval (7 to 28 lengths per minute). Run-in motor makes it easy to start new coils. Takes coils up to  $\frac{1}{10}$ "  $\times$  36". Cradle capacity is 10,000 pounds.

Also available: Hydraulic-Drive Feeding and Straightening machines, taking coils up to 90" wide. Inch forward and reverse speeds (for easy threading of new coils) as well as automatic forward cycling from 30" to 160" feeding length. Cradles up to 90" and 30,000 lb.



This roll, covered with Dilecto, "handles with care" the steel strip it processes . . . protects shining finishes . . . reduces noise, and actually wears longer than ordinary steel rolls!

# HANDLES with GENTLE CARE . . .

# Yet Plenty TOUGH When It Comes To Wear!

Now you can take advantage of a molded plastic that gives you the strength and toughness of steel—at far less weight. Dilecto gives you many extra advantages that can help you improve product design, performance, and appearance. It offers you positive moisture and heat resistance. Dilecto is a non-metallic and non-conductor that absorbs shock and cushions vibration like rubber—yet wears like steel! And it's readily workable, too. Like wood, it can be drilled, tapped, shaped, milled, and threaded—in little time, and with little effort.

Discover for yourself the many indus-

trial jobs this unusual material can do better, and at less cost. Just get in touch with your nearest C-D office and ask for an experienced technician. He has additional information about *Dilecto* that will interest you. Call or write, now.

A Few of Many Possible Applications: Bearings • Gears • Sleeves Couplings • Structural Supports, etc.

Available Standard Forms: Sheets
Rods • Tubes.

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Enlarged plant facilities . . . our own foundry . . . labor and materials supply - these permit us to offer unexcelled delivery service on radiators.

We invite your inquiry on heat transfer units engineered especially for your requirements. Applications include motor trucks, tractors, combines, industrial trucks, compressors, locomotives, power plants and other equipment. Also oil coolers, intercoolers, heat exchangers.

A rollcall of Yates-American radiator users includes such names as: Fairbanks-Morse, Buda, Gardner-Denver, Waukesha Motors, Clark Equipment, Continental Motors, General Electric, Oliver, Westinghouse, American Locomotive, Ingersoll-Rand, GMC Truck & Coach Division — and many others.



ATES-AMERICAN MACHINE CO.

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The STANDARD SCLEROSCOPE (Now highly Improved) for more than twenty years has made good and is still used for doing the world's hard work in testing. In general use for specifications purposes. Simple, Sturdy, Comparatively Inexpensive. Illustrated bulletins free. FOR QUALITATIVE AND QUANTITATIVE HARDNESS MEASUREMENT, under Static Pressure, the MONOTRON is the only machine now available. Operative up to over 2000 Diamond Brinell. Avoids errors due to spring in test pieces. Takes readings with the load on, avoiding reversal lash errors. No setting to sero. Operates at highest Speed. Has solved many old laboratory and shop problems. We also make the Durometer for testing the hardness of rubber. Comprehensive bulletins free.

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THE SHORE INSTRUMENT & MFG. CO. as Wyek Ave. and Carll St., Jamalea, New York, N. Y. Agents in all Foreign Countries

Buy **Bonds**  (Continued from page 290)

other than decorative work have shown increasing activity, namely the electroforming of specific articles, building-up of worn parts, and particularly the use of heavy nickel deposits on processing equipment in the chemical engineering, and food industries. Much interest has been aroused by the availability of steel pipe and tubing lined with electrodeposited nickel.

Nickel plated steel wire suitable for redrawing and fabricating has become available in limited quantities. Electroformed screen has been employed in amounts comparable to the best prewar years, and electrodeposited foil is progressing from development work to the commercial stage. Research by various technical societies and cooperating organizations is adding to the knowledge of such properties of nickel deposits as strength. corrosion - resistance and internal stresses, and of practical means of obtaining the most desirable proper-

#### Raybestos Appointments

Franklin A. Miller is the head of the new Marketing and Merchandising Dept. of Raybestos-Manhattan, Inc. James A. Wheatley, Jr. replaces him as Sales Manager for Grey-Rock products.

#### BOOKS ···

POWDER METALLURGY, by Alexander Squire, Member of the Staff of Westinghouse Electric Corporation Research Laboratories. Published by Mapleton House, Brooklyn, N. Y. Price \$8.00.

This important book contains formerly re-This important book contains formerly restricted information based on experiments made between 1944-1945 in the Watertown Arsenal laboratories. Contents include: Critical Survey of Powder Metallurgy; Comparative Properties of .55 Carbon Steel Bars formed by Conventional and Powder Metallurgy Methods; Evaluation and Correlation of the Quality Characteristics of Powdered Iron Compacts; Effect of Dimensions upon the Density and Mechanical Properties of Iron Powder Compacts; Density as a Criterion of Mechanical Properties. There are over 200 pages of text, 65 plates with drawings, tables, formulas and 12 photographs. 12 photographs.

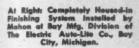
WORK ROUTING, SCHEDULING AND DISPATCHING—3rd Edition, by Younger and Geschelin, published by Ronald Press. The third edition of the well known text originally prepared by John Younger, late head of the department of industrial engineering at Ohio State University, has been completely rewritten and brought in line with post-war industrial practices by Joseph Geschelin, Detroit Editor, AUTOMOTIVE INDUSTRIES, who collaborated with Prof. Younger in preparing the second edition. Although originally intended as a text for students in engineering schools and for those specializing in industrial engineering the present edition should be of value to practicing engineers and others concerned with plant management. It is also hoped that the text can be useful in training courses planned by the large manufacturers. The subject matter covers the gamut of problems that are met in the production and planning departments, the text being arranged for quick reading and profusely illustrated. Such topics as obsolescensce, evaluation of machinery, depreciation policies, selection of machinery for specific requirements, dealing with workers, and severatother chapters are entirely new and characters. quirements, dealing with workers, and several other chapters are entirely new and characteristic of the modernity of the approach to management problems.

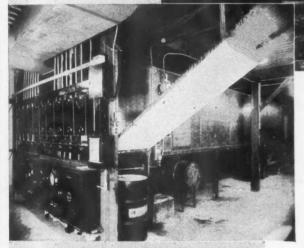


FINISHING SYSTEM

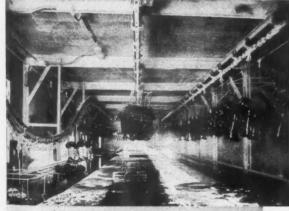
SYSTEMS

for ENAMEL . LACQUER . PAINT





Interior of Mahon Dip Enamel Finishing System at Electric Auto-Lite, Showing Control Panel, Dip Tank and Drip Enclosure. Ovens are located above.



Interior of Mahon Dip Enamel Finishing System Showing Dip Tank and Drip Enclosure—Part of the Complete Finishing System at the Electric Auto-Lite Co., Bay Mfg. Division.

AT Bay Mfg. Division of The Electric Auto-Lite Co., new finishing and plating equipment was necessary, but plant space was not available to house the new equipment. Plant expansion construction, already under way, was delayed due to material shortages. The Mahon organization designed and installed a complete dip enamel finishing system adjacent to existing manufacturing buildings, and housed it in-the housing becoming an integral part of the system. It is so designed as to remain intact when new construction is completed—the present housing will become the finishing room enclosure in the new building. This finishing system is very compact, and consists of a six stage metal cleaning and rust proofing machine, a dry-off oven, a dip tank and drip enclosure, baking oven and conveyor—all controlled from one panel-board which groups all control switches, safety devices and recording instruments. If you are confronted with a finishing problem, at the present time, or are contemplating new finishing equipment in the near future, call on Mahon now . . . twenty-seven years of experience, constant research and pioneering development, in this highly specialized field, have endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon Insert in Sweet's Mechanical Industries File for complete information.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 11, Mich. . WESTERN SALES DIVISION, Chicago 4, III.

Engineers and Manufacturers of Complete Finishing Systems including: Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, and Drying and Baking Ovens. Also Paint Reclaiming Units, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

MAHON

#### Personals

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufac-turers and Their Suppliers.

Kaiser-Frazer Corp. - Leslie M. Spencer has been appointed Metallurgist of the Dowagiac, Mich., Division.

The B. F. Goodrich Co .- John R. Hickman appointed director of field sales personnel. S. L. Brous, head of new Chemical Sales Dept.

The Studebaker Corp. - Emil G.

Schmidt has been appointed Foundry Supt. and William R. Myers head of the Stamping Div.

The White Motor Co.-William B. Tierney has been made Asst. Sales Manager, Wholesale Div.

Willys-Overland Motors-Walter D. Appel, former Chief Engineer, has been appointed Director of Purchases. George J. Edellstein, General Purchasing Agent and Robert E. Busey, Acting Chief Engineer.

Boeing Airplane Co.-Ralph B. Gilbert, formerly Asst. Chief Industrial Engineer, Seattle Div., has been appointed Staff Asst. to John O. Yeasting, Asst. to the President.

Ford Motor Co.-F. D. Bullock has retired as Director of Material Control.

Fairchild Engine & Airplane Corp., Ranger Aircraft Engines Div. Eric Preece has been appointed to the newly-created post of Works Man-

Curtiss-Wright Corp.-William D. Kennedy elected Vice-President.

The Timken Roller Bearing Co .-Pardee H. Frank, Service Manager, has announced his retirement. Elmer Anderson succeeds him.

Niles-Bement-Pond Co. - Richard F. V. Stanton has retired as Vice-President and Asst. Sales Manager. Leslie McArthur, Manager of the Chandler-Evans Div., was elected a Vice-President.

Bendix Aviation Corp.—Theodore Voorhees has been made Asst. General Manager of Bendix International, Export Div. of the company.

Bendix Aviation Corp. -Winkler, Jr., appointed Chief Engineer of the Bendix Stromberg Carburetor Dept.

Eaton Mfg. Co., Axle Div.-John R. Bartholomew has been promoted to Asst. Sales Manager.

Ethyl Corp.—Wheeler G. Lovell has been made Assoc. Director of Research, Ethyl Research Laboratories, in the basic combustion field.

American Brake Shoe Co.—Kellogg Div.-Frank W. Seivert has been appointed Advertising Manager.

Sterling Engine Co.—John Shotwell has been appointed General Manager.

Carboloy Co., Inc.-F. C. Ritner, formerly Personnel Director, has been made Vice-President in charge of Personnel.

Progressive Welder Co. — Joseph R. Lex has been appointed Asst. General Manager.

Monroe Auto Equipment Co .- R. R. Rolph made Sales Manager of Automotive Div.

Union Carbide and Carbon Corp .-William J. Priestly elected a Director of the Corporation.

National Formetal Co.-Mrs. Anne Jacobsen has been named a Vicepresident.

Pennsylvania Salt Mfg. Co.-Y. F. Hardcastle, Vice-President in charge of Manufacturing, has been made a member of the Board of Directors.

(Turn to page 296, please)

#### Getting down to Essentials



#### with TUTHILL SPRINGS

Let's start right at the bottom of things:

First:

A trailer assembly-built by United Mfg. Co., Bedford, Ohio. Soundly designed, stoutly built, ready for a multitude of uses.

Second: Alloy-steel leaf springs-built by Tuthill. Tough and sinewy, ready to withstand a whole lifetime of punishing jolts and endless flexing.

The Tuthill springs on that trailer were painstakingly selected. Here's why—Scores of different bodies will be built on that trailer frame. Hundreds of different types of load will be carried. Fine quality at low cost was essential. Tuthill alloy-steel leaf springs were chosen. They and the trailer make an unbeatable combination. It is a combination that will see many million miles total of hard service. These springs are but one of scores of Tuthill models. Consult Tuthill, and find the ideal spring for your needs. Our engineers will be glad to answer any question on springing. There is no obligation. Simply write.



#### TUTHILL SPRING CO. 762 WEST POLK ST. CHICAGO 7, ILLINOIS

Spring Makers since 1880



Pexas Strato pie erra un ple erra un ple erra dri an slici Lu was lui pro coo wi Da wh pin for pro on St wi Pr

M 21

# DANLY Special Purpose Straight-Side Presses

Permanently inclined to 23 degrees, this eccentric gear press shows one example of the adaptations of Danly Straight-Side Presses which can be built to fit your needs. The frame is of four piece tie rod construction. Its clean modern design facilitates rapid loading and unloading and easy scrap removal.

Large square back gibs provide an ample bearing surface to keep the slide in perfect alignment. Air cylinders enclosed in the uprights adequately counterbalance the weight of the slide, gear train and dies.

Danly Circulating Filtered Oil System brings the right amount of clean, pumpdriven, filtered oil to all gears, bearings and driving members in the crown and slide, including the flywheel bearings. Lubricating the flywheel bearings in this way makes it unnecessary to manually lubricate this member at the top of the press.

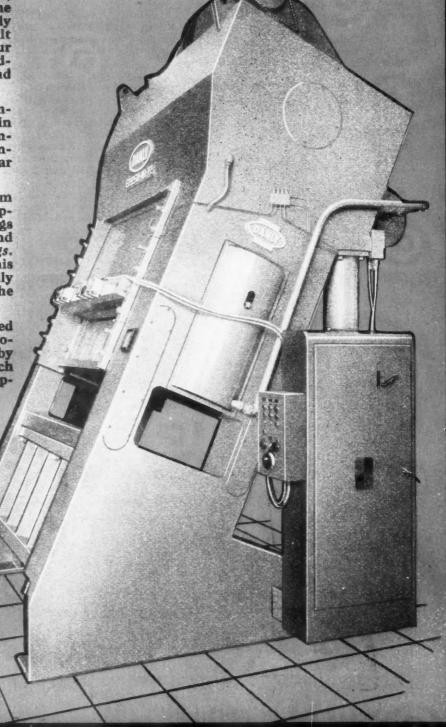
Safety is assured by the fully enclosed construction of this press, by the two-wire electric control system, and by Danly's cool running air friction clutch which provides instant starting and stopping of the driving machinery.

You can get further information on the type of press shown here or on any one of a complete line of Straight-Side Presses by writing or calling Danly's Press Division.

DANLY

MACHINE SPECIALTIES, INC.

2100 S. 52nd Avenue, Chicago 50, Illinois



The Press for Modern Production

#### Personals

(Continued from page 294)

Casco Products Corp.—U. S. Mozmeck has been appointed Sales Promotion Manager.

Hoof Products Co. — Addison C. Hoof, Jr., has been made special sales representative and Hugh G. Kepner, made Sales Engineer.

Bear Manufacturing Co.—Edward Quekels named director of a newly created product development and service department. Walter V. Hall is Sales Manager of Automotive Alinement and Industrial Balancing Equipment.

Allis-Chalmers Mfg. Co.—James M. White, Vice-President in charge of Manufacturing, has announced his resignation. Manufacturing operations will be in charge of Fred S. Mackey.

F. L. Jacobs Co. — Clarence M. Strong has been named Director of Purchases.

Micromatic Hone Corp.—A. J. Prentice, who has been Secretary and Treasurer of the company has resigned as Secretary. He retains the position of Treasurer. Gerald Carlisle has been appointed Secretary and Asst. Treasurer.

Firestone Tire & Rubber Co.—William A. Karl has been promoted to President of Firestone Textiles, a company subsidiary.

Mack Truck, Inc.—F. R. Harrison elected to office of Asst. Secretary and Asst. Treas. T. Wroldsen has been elected an Asst. Secretary and J. A. Jackson an Asst. Treas. New York City is the headquarters of the three officers.

Packard Motor Car Co.—Neil C. DeSantis is the new manager of Car Distribution. C. D. Thomas has been made manager of the Sales Promotion Dept.

General Motors Corp., Chevrolet Motor Div. — Harry F. Blankenship has been appointed Asst. Manager of the Commercial and Truck Depts.

Ford Motor Co.—Marshall E. Beaman has been made Asst. Manager of Industrial Relations; Robert S. Dunham is also an Asst. Manager of Industrial Relations and Thomas A. Beaver, Director of Salaried Personnel. Dr. Joseph A. Russell has been appointed geographical consultant to the Marketing Research Department.

Willys-Overland Motors—Irving B. Gould has been named Asst. to the General Sales Manager, in charge of Office Management.

Luscombe Airplane Corp. — H. G. Erickson appointed Chief Engineer of the company.

Pacific Airmotive Corp.—John G. McKean appointed Treasurer.

The Timken Roller Bearing Co.—Blair Glenn, Asst. Factory Manager, Canton Bearing Div.; Henry Tobey, General Supt., Canton Bearing Div.; Fred Barnard, Canton Bearing Factory Metallurgist; Joseph Selby, Asst. Metallurgist and Russell P. Fowler appointed Supt., Bucyrus Bearing Factory.

E. I. duPont deNemours & Co. — Finishes Div.—Harry R. LaTowsky, appointed General Asst. Sales Manager, Specialty Sales.

Simonds Abrasive Co. — W. E. Byrne, District Sales Manager, Detroit.

Air Reduction Sales Co. — Dale D. Spoor, appointed Sales Promotion Manager; Russell S. Schmidt, Manager, Dealer Sales Dept.

Stewart-Warner Corp., South Wind Heater Div. — A. N. Phillips named Director of Purchases.

The Reliance Electric and Engineering Co. — C. Richard Newpher, Production Manager of the Ivanhoe Div. has also been appointed Division Manager.





Shear Type Bonded Rubber design gives superior shock isolation—Long Service Life.

G.

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The Lord line of mountings covers a complete range of styles, shapes, and sizes to fill your mounting requirements.

Send for your copy of Bulletin 103; it contains valuable information on Vibration Control. N the Towmotor an effective means of cushioning shock and of accomodating misalignment between the vehicle frame and the engine was essential. This protection for the power plant was obtained by the use of Lord Bonded Rubber Tube Form Mountings.

In addition to these advantages the flexible mounting of the motor on four Lord Tube Form Mountings achieves a smooth delivery of power that improves performance, reduces transmission of engine noise, and decreases operator fatigue . . . all of which means greater customer satisfaction and increased sales.

A Lord Vibration Control System adds little to cost—adds immeasurably to performance and length of service. Bring your vibration problems to Lord—Vibration Control Headquarters.



with Vibration Control

LORD MANUFACTURING CO. . ERIE, PA

Rold Offices - Dynali \* Chicago \* Nov York \* Washington, D.C.

condition Processing the Challengy & Power Engineering Carp. L

#### **UAW Sponsors Process For** Making Oil from Coal

The UAW-CIO is actively promoting a new process for distilling gas from coal. The union recently sponsored a demonstration in Detroit by L. C. Karrick, a former chemical engineer for the U.S. Bureau of Mines and the Navy Dept., who developed the process. During the demonstration he extracted oil from coal at a rate of 99.1 gallons per ton. In addition to oil, the process also yields gas and smokeless solid fuel and also can be used to produce electricity. The chemist said that his process has

been tested by the University of Utah and that he owns several patents on the process which he will not sell but would make available for public use. He added that on a commercial scale, the distillation of coal requires steam as a distillation agent.

#### Ferry Made Director of Packard

Hugh J. Ferry has been elected a director of the Packard Motor Car Co. He has been associated with the company 38 years and has been treasurer since 1926, secretary and treasurer since 1934, and vice-president since 1945.

#### Cleveland Pneumatic to Make Tractors in Brazil

The Cleveland Pneumatic Tool Co. is now working out plans for tractor assembly plants in Argentina and Brazil. Tentatively about 200 Leader farm tractors a month will be produced in Brazil, with most of the parts coming from the U.S. Discussions concerning similar deals with France, India, and the Union of South Africa are now going on, according to company officials.

#### Fire Causes Heavy Damage At L. A. Young Plant

Although fire nearly destroyed the Detroit plant and main offices of the L. A. Young Spring and Wire Corp., suppliers of automotive seat cushion springs, automobile production is not expected to be affected to any degree. GM said that it would not be affected immediately, and possibly not at all. Customers of the company were notified that they probably would not be affected by the fire because of materials in storage.

#### UAW Authorized to Organize Office Workers

As a result of an NLRB ruling authorizing production unions to or-ganize white-collar workers, the automobile industry is expecting a revival of the UAW-CIO drive among clerks and office workers. NLRB ordered elections among white-collar workers at Chrysler's John R and Dodge Main plants.

#### **Elect Pierce Vice President** of Farm Equip. Inst.

Frank R. Pierce, president, Dearborn Motors Corp., has been elected a vice-president of the Farm Equipment Institute. Dearborn Motors markets the Ford tractor and Dearborn farm equipment.

#### Sell New Self-Healing Tire In Four States

B. F. Goodrich Co. has started marketing its new tubeless tires in a four-state area including Ohio, Indiana, Kentucky and West Virginia. In a demonstration for the press in Cincinnati, a car equipped with tubeless tires was driven over three inch spikes which pierced the tires, but a check later revealed that they did not lose their original air pressure.

#### GM's Venezuelan Plant Starts This Fall

A new GM assembly plant in Caracas, Venezuela, scheduled to start operations this fall, will produce trucks and commercial vehicles.



#### USE FAIRFIELD'S ENGINEERING SERVICE!

★ Call Fairfield in at the start on your gear problems it may save you a lot of time. Fairfield gear engineers are qualified to make expert recommendations on your problems - as a result of their broad experience in designing and making automotive type gears for all kinds of industrial uses. They are specialists and can help you on the design of gears that are the most economical to produce, most certain to give good service. This is another one of the PLUS VALUES you get when you depend on Fairfield for FINE GEARS. Submit your gear problems for FAIRFIELD'S ENGINEERING SERVICE.

WORMS AND WORM GEARS .

#### GEARS MADE TO ORDER

SPUR. Straight, helical, and internal. Sizes from 16 pitch, 11/2" dia. (approx.), to 11/2 pitch, 36" dia. (approx.).

HERRINGBONE. Sizes from 11/2" to 15".

SPIRAL BEVEL. Sizes from 16 pitch, 11/2" dia., (approx.), to 11/2 pitch, 28" dia., (approx.).

STRAIGHT BEVEL. Sizes from 15 pitch, 11/2" dia. (approx.), to 11/2 pitch, 28" dia. (approx.).

HYPOID. Sizes from 11/2" to 28" dia. (approx.).

ZEROL. Sizes from 16 pitch, 11/2" dia. (approx.), to 11/2 pitch, 21" dia.

WORMS AND WORM GEARS. Worms to 7" dia. Worm gears to 36"

SPLINED SHAFTS. Lengths to 45" Diameters from

DIFFERENTIALS. Complete units.

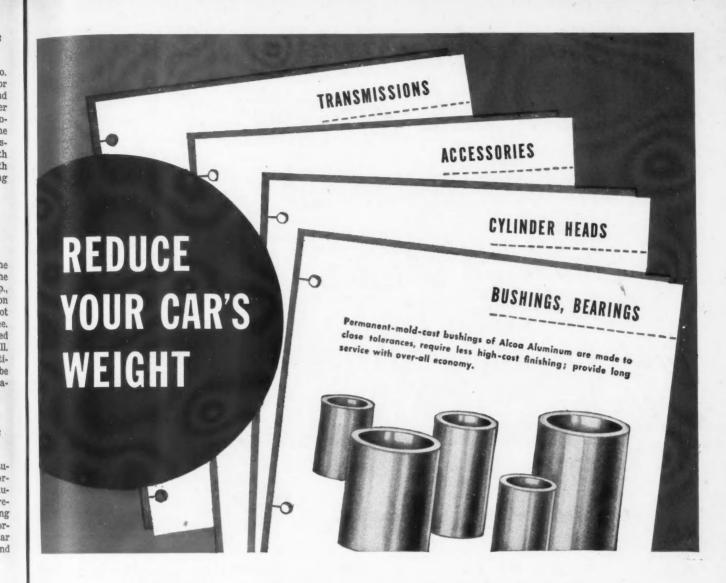
MANUFACTURING CO. 319 South Earl Avenue Indiana



STRAIGHT

SPUR

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#### with Permanent-Mold Castings of ALCOA ALUMINUM

Without changes that will slow your production line, aluminum castings by Alcoa can reduce the over-all weight of your car. Alcoa is ready to supply such castings without delay.

Permanent-mold castings of Alcoa Aluminum are made to close tolerances, require less high-cost finishing; are lighter, easier to handle.

As bearings and bushings, Alcoa Alumi-

num parts are bearing metal all the way through, provide long service with over-all economy.

Corrosion resistant, Alcoa Aluminum requires no painting.

For a better car, without costly changes, specify Alcoa Permanent-Mold Castings. Your local Alcoa sales office will be glad to quote. ALUMINUM COMPANY OF AMERICA, 2110 Gulf Building, Pittsburgh 19, Penna.



March 15, 1948

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Most Americans prefer to

start their cars this way



... and you can install Push-Button

Starting FOR LESS

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the Bendix SIM



PREFERRED FOR THE FINEST CARS...

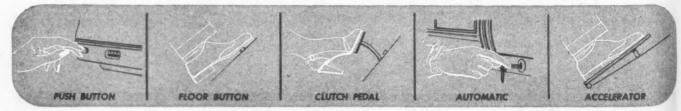
at the lowest possible cost.

USED BY TWO OF THE THREE LEADING QUANTITY PRODUCERS! The convenience of push-button starting makes it the outstanding choice of most drivers. And the important fact is that you can install it with the Bendix\* Drive for less than any other way! You get a triple value from this choice. First, you obtain the best proved starter drive in the industry. Second, you add an important sales advantage to your cars. And you do all this

Investigate the advantages of the Bendix Starter Drive. Your inquiries are invited.

\*REG. U. S. PAT. OFFICE

NO MATTER WHAT TYPE OF STARTING YOU SELECT-YOU CAN BETTER-DO IT FOR LESS WITH BENDIX DRIVE!



ECLIPSE MACHINE DIVISION of ELMIRA, N. Y.

Detroit Office: 8-212 General Motors Bldg.



# I'LL SAVE YOU HALF... Moving, Lifting and Stacking Your Materials!



PRESS THE BUTTON!

# MUSCLE MIKE Makes Tons Feather-Light with TRANS-TRIPLETS' Feather-Touch Operation



PLATFORM TRANSPORTER — Lifts and moves 2,000, 4,000 and 6,000 pound loads with feather-touch of thumb on buttoms. Pallet and platform models. With ATCO Bectric Lift or DUAL-LIFT Foot Pump.



TRANSTACKER—Combines all features of Transporter, with a high-lift feature for stacking of 2,000 to 5,000 pound loads in seconds. Light in weight for limited floor and elevator capacities.



TRANSTRACTOR—will push or pull 6,000 pounds all day long . . . or up to 20,000 pounds intermittently, depending on type of load. Transporter power unit and finger-tip button control.

Yes ... all you have to do is PRESS THE BUTTON . . . and presto, Automatic's TRANS-TRIPLETS you see pictured here, move, lift, tow ... and even stack your material with amazing touch-of-thumb ease. Tons of raw material or finished product are made FEATHER-LIGHT ... are moved efficiently into, around, and out of your plant with FEATHER-TOUCH operation!

A miracle of scientific engineering puts Muscle Mike, the mighty midget in TRANS-TRIPLETS' electric power units, to work for you. Labor's load is lightened, workers are released for more productive work, and manage-ment's load is lightened too.

For it is a matter of record, that Automatic's Transporters, Transtackers and Transtractors . . . alone, or in combination . . . have cut handling costs as much as 60% in all kinds of

One plant, with a single Transporter, cut handling costs \$24,480.00 in one year. Workers gained a bonus of freedom from gruelling, back-breaking manual handling, production was ac-celerated, orders filled faster, customers got quicker service.

Investigate how you can put these industry-tested wonders of electric moving and lifting power to work for you. They pay for themselves in a surprisingly short time, give you permanent relief from the high overhead of manual material handling. Mail the coupon for complete facts.





FOR FREE SHOWING "THE TRANSPORTER NEWS REEL'

Starring the Trans-triplets Narrated by Muscle Mike

#### **AUTOMATIC TRANSPORTATION COMPANY**

DIV. OF THE YALE & TOWNE MFG. CO.

57 West 87th Street, Dr.Pt. C-8, Chicago 20, III.

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handling costs.

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MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

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DETROIT GASKET & MANUFACTURING COMPANY

DETROIT 23, MICHIGAN

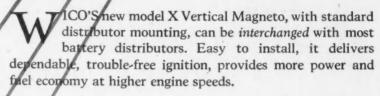
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Announcing WICO'S New DISTRIBUTOR-MOUNTED SIX CYLINDER MAGNETO The XV-6

Ball Bearing

Automatic Advance

Impulse Coupling



This new Wico Magneto operates independently of other engine accessories, with no battery or outside electrical connections. Because it generates sparks as a self-contained unit it's particularly adaptable to engines powering industrial and marine equipment subject to idle periods or requiring the best in ignition for efficient operation. It produces a strong starting spark regardless of the condition of the battery or drain on the battery resulting from engine starting loads.

World's largest producer of magnetos exclusively, WICO has been making distributor-mounted magneto ignition for over seven years. Finest of its type, this new X Vertical was laboratory tested with 50,000 starts and stops, with cold-room tests to temperatures of  $-30^{\circ}$  with 150 hours on the water-brake load test at full speed and full horsepower, and with 3500 hours of field test in non-stop operation on a California oil field pumping installation. Four bearings—three of the porous bronze type and one shielded, sealed ball, all prelubricated, guarantee long mechanical life without attention.

XV-6 magnetos are adaptable to Buda, Brockway, Chrysler, Continental, Hercules, LeRoi, Mack and Waukesha engines. If you manufacture gasoline engines, equipment using gasoline power units, or operate equipment requiring *the best in ignition*, write for information on this new Vertical magneto.



Trained field engineers and over 2,000 authorized service stations serve WICO users everywhere. Wico Electric Company, West Springfield, Massachusetts.

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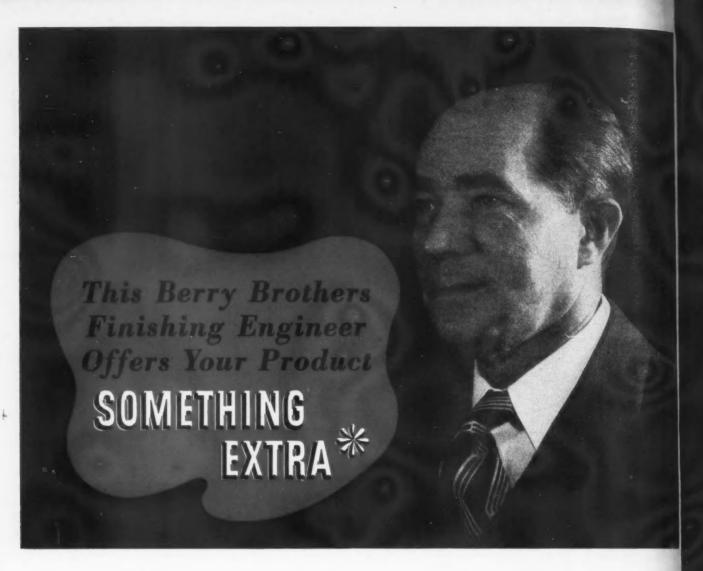
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Meet WALTER PIPER—an important member of the Berry Brothers sales staff for 36 years. The "Something Extra" that Walter (and every member of the vast Berry Brothers organization) offers your product is Berry Brothers 90 years experience in making fine finishes.

You see, Walter and his associates are technically-trained paint experts. They know how to correctly interpret your finishing problems . . . they know where to find the practical answers. Their personal "know-how" backed by Berry Brothers 90 years experience is helping many of the nation's leading manufacturers . . . in improved product quality, reduced costs and more efficient finishing operation.

This wealth of experience is free to you. Let our finishing experts check over your finishing requirements . . . let them analyze your present finishing methods. They may be able to suggest improvements that can lead to greater savings . . . better quality . . . increased production. Write today. BERRY BROTHERS, Detroit 7, Michigan.

# BERRY BROTHERS

**Industrial Finishes** 

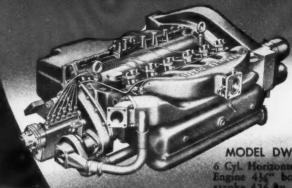
Makers of Fine Finishes Since 1858

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MC Cyl. 3/8" bo 84 cu.

OW OPERATING COST SMOOTH FLEXIBLE POWER \*PROVEN PERFORMANCE



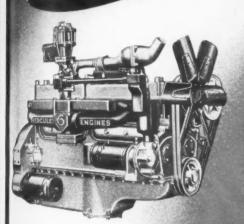
MODEL DWXLDE

## ENGIN GASOLINE

High speed, heavy duty Hercules Engines in both gasoline and Diesel models are available in a wide range of horsepower and cu. in. displacements to meet the diversified power needs of the Automotive Industry. Built by the world's largest exclusive engine manufacturers, Hercules Engines for commercial vehicles reflect the broad experience and the "know how" that can only be acclaimed by specialists. Switch to Hercules with full confidence that they will measure up to the toughest of power assignments the Automotive Industry has to offer.

### HERCULES ENGINES 3 TO 400 H.P.

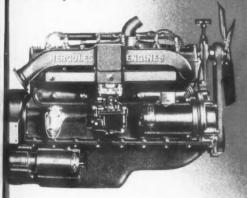
DIESI	DIESEL ENGINES		DIESEL ENGINES (Cont'd)			GASOLINE ENGINES (Cont'd)		
Model	Bore and Cu. In. Stroke Displ.	Model	Bore and Stroke		Model	Bore and Cu. In. Stroke Displ.		
DIXC	Cylinder 4" x 41/2" 113.1	DFXE **DFXH	5%" x 6" 5%" x 6"	895 935	QXA Si	x Cylinder 31/4" x 41/4" 190		
DIXD	41/4" x 41/2" 127.5	Eight Cylinder			QXB	31/4" x 41/8" 205		
Fou	r Cylinder	DNX V-88	5¾" x 6"		ØXFD ØXC	3 1/6" x 41/6" 221 37/16" x 41/4" 236.7 31/2" x 41/4" 245		
DIX48 DIX4D	31/4" x 4" 133 35/6" x 4" 166	DNX V-8C	6" x 6"	1348	1XB 1XB	3½" x 4¼" 245 3½" x 4¼" 263 3¾" x 4¼" 282		
DOOR DOOC DOOD	3½" x 4½" 198.8 4" x 4½" 226.2 4¼" x 4½" 255	DNX V-8D	61/4" x 6"	1468	JXD	4" x 41/4" 320 4" x 41/2" 339		
Six Cylinder		GASOLINE ENGINES			WXC-3	41/4" x 41/2" 383 4" x 43/4" 358		
DIX6D DJXB	35/8" x 4" 249 31/2" x 41/2" 260	Tv	vo Cylinder		TDXB RXB	41/4" x 43/4" 404 43/8" x 51/4" 484 41/2" x 51/4" 501		
DIXC	3½" x 4½" 296 3½" x 4½" 298	BXB NXA	2 1/a" x 3" 3" x 4"		RXC	45%" x 51/4" 529 45%" x 51/4" 529		
DWXC	4" x 4¾" 358 4¼" x 4¾" 404	NXB	31/4" x 4"	66.3	RXLD **RXLDH	4¾" x 5¼" 558 4¾" x 5¼" 558		
DRXB	43/8" x 51/4" 474	ZXA	ur Cylinder		HXB	5" x 6" 707		
DRXC DFX8	45% x 51/4" 529 5" x 6" 707	ZXB	21/2" x 3" 25/8" x 3"		HXC	51/4" x 6" 779 51/2" x 6" 855		
DFXC	51/4" x 6" 779 51/2" x 6" 855	IXA	3" x 4" 31/4" x 4"	113	*HXE	5¾" x 6" 935 5¾" x 6" 935		
	h output performanc		-/-		1	Dual carburetion.		



\* LONG LIFE

#### MODEL TOXB

Cyl. Gasoline Engine
%" bore x 5½" stroke 4 cu. in. displacement.

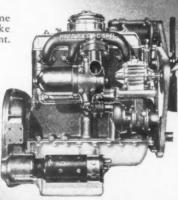


### MODEL JXD

6 Cyl. Gasoline Engine 4" bore x 4½" stroke 320 cu. in, displacement.

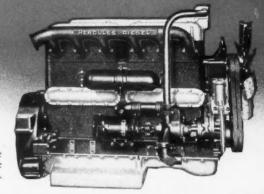


4 Cyl. Diesel Engine 41/4" bore x 41/2" stroke 255 cu in displacement.



### MODEL DFXE

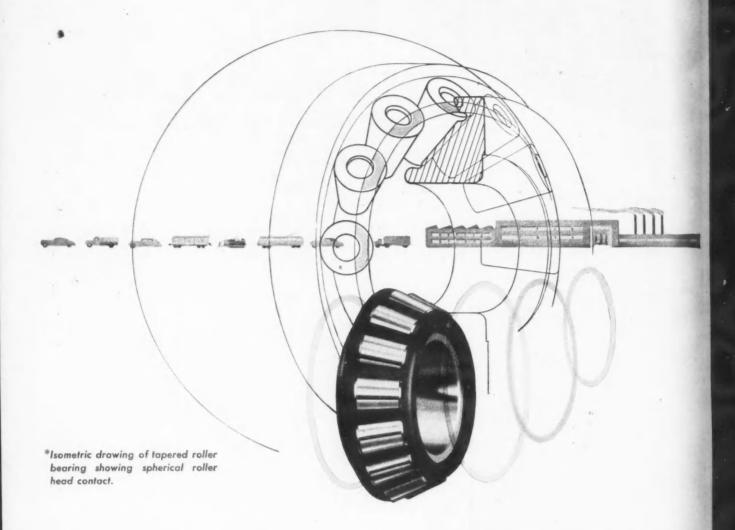
6 Cyl. Diesel Engine 55%" bore x 6" stroke 895 cu. in. displacement.



HERCULES MOTORS CORPORATION

## GOOD BEARINGS

### are SPHER-O-HONED bearings



SPHER-O-HONED bearings . . . developed by Bower . . . are especially designed to bring better performance to many bearing applications.

Visualize the SPHER-O-HONED bearing as we have done above. You'll see a significant step forward in design that makes it the most advanced bearing in its field. The drawing\* shows the spherical roll-end and cone

flange... made to fit each other exactly. This results in added precision that not only greatly reduces wear, but contributes to better alignment, smoother performance, and longer bearing life.

Write for the Bower Engineering Catalog. It gives complete technical information.

BOWER ROLLER BEARING COMPANY . DETROIT 14, MICHIGAN

BOWER

ROLLER BEARINGS









with KENT-OWENS

Milling Machines

Today more than ever—production men are depending on Kent-Owens Milling Machines for the speed and accuracy that keeps production LD and page devel

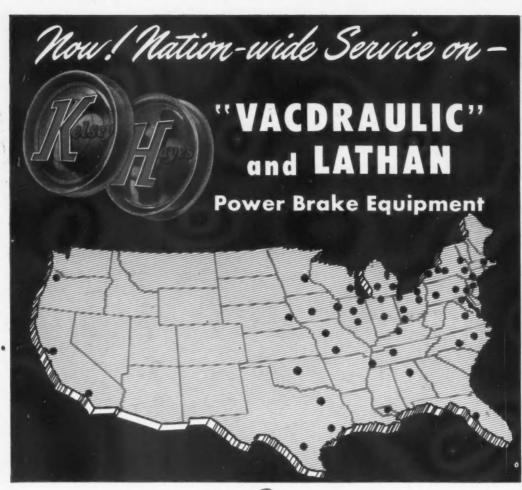
tion UP and costs down!

These machines are versatile—adaptable to countless milling jobs. They're outstandingly rugged . . . efficient . . . dependable. Designed for easy handling with practical features that shop men

handling with practical features that shop men like. The Kent-Owens Standard line includes a wide range of hydraulic and hand operated machines.

If you're "floored" by a tough milling problem—call on Kent-Owens! Let our engineers recommend machines and tooling best suited to your requirements. Write us about your needs. Kent-Owens Machine Company, Toledo, Ohio.

No. 2-20 Milling Machine Table, 42" x 12" Table Travel, 20"



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National Brake Service ..... South Bend 6 AWOI

Stone Wheel Incorporated ..... Davenport Des Moines Wheel & Rim Co., Des Moines 12 KENTUCKY

Auto Wheel & Rim Service .... Louisville 3 LOUISIANA Southern Wheel & Rim .... New Orleans 13

MARYLAND

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Southwest Wheel Inc. .... Houston 2
Southwest Wheel Inc. .... San Antonie 6

VIRGINIA Power Brake Service ......Richmond 3

WISCONSIN Badger Trailer & Body Corp., Milwaukee 4

Wheels—Hub and Drum Assemblies—Brakes—"Vacdraulic" Brake Power Units—for Passenger Cars, Trucks, Buses—made by Kelsey-Hayes' 4 Michigan Plants and Windsor-Canada Plant • "Magdraulic" Electric Brakes • "Lathan" Vacuum Power Brake Equipment for Tractor-Trailers-made by Kelsey-Hayes' South San Francisco-Lathan Plant Wheels—Hubs—Axles—Parts for Farm Implements—made by Kelsey-Hayes' French & Hecht Plant at Davenport, Iowa



Kelsev-Hayes' Lathar Deluxe "Finger tip" Hand. Control Valves for trailers are considered the best available.



Kelsey-Hayes' Vacdraulic Superior Power Units, with feather-touch control, have valves and all other moving parts sealed inside,



Kelsey-Hayes' Lathan Conversion Valves, operating trailer air-suspended power chambers, are nationally proven.



Kelsey-Hayes' Lathan Power Chambers, in use 20 years, are universally adopted.



Kelsey-Hayes' Lathan Vacuum Reserve Tanks for trailer power brakes are most dependable.



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THESE capable low voltage D.C. Micromotors are loaded with stamina. They're built in compact sizes up to 1/20th\* horsepower and have gone through years of refinement especially for the automotive trade. Torque characteristics are uniform and their reputation for quietness and long-life is unexcelled. You'll find them sturdily constructed,

neat in appearance and readily adaptable. In a wide variety of products used throughout the world, more than 20,000,000 Redmond Micromotors have proven their high quality. Whenever you are in need of small electric motors, or have difficult application problems to solve, call or write Redmond.

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Expended facilities. Prompt deliveries. Service before and effect the self
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MAIN OFFICES: OWOSSO, MICHIGAN

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employees and over 5 acres of floor area.

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at the core



That steel is "comfort engineered" by Mcherney into cushion spring constructions which deliver the maximum in sustained comfort. You'll find McInerney cushion spring constructions in the best automobiles. Leading manufacturers have used them for a generation.

For trucks and taxis, ready-to-install McInerney Travel Comfort Cushions\* offer the modern, practical way to handle seating. They are specially designed and engineered to fit the particular vehicle, completely upholstered and covered by expert "tailors" with whatever materials you prefer, and delivered ready for installation. And, they are fully guaranteed.

● FOR YOUR SEATING NEEDS Be sure to check the advantages of Travel
Comfort Cushions. McInerney seating engineers are ready
at all times to give you sound counsel and prompt service.

\*Trade-mark Reg. U. S. Pat. Off.

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SPRING & WIRE COMPANY

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# HAS BEEN ADDED TO THE OUTSTANDING FEATURES OF GREENLE

Relieved Section Allows for Quick Cam Approach ead Screw Lead



Operators on Greenlees have plenty of elbow room to work in the tooling area, for changing tools, making adjustments, checking work during set-up, etc.

Change-overs are speeded by a quick and easy adjustment for the main tool-slide stroke. No cams to struggle with-just a simple setting to make on a graduated worm wheel.

Tool-holders for the cross-slides are interchangeable so any tool fits all cavities.

Feed-setting on cross slides is fast and simple, using standardized and interchangeable cams - any of which will fit any slide.

Cam-controlled threading feed is a standard built-in feature on Greenlees, including built-in drive sleeves in four positions.

Cross-slides are independently operated - permitting the set-up man to select from a wide variety of tooling arrangements and make adjustments as necessary.

AND NOW an extra feature to meet modern production demands -LEAD SCREW FEED for extra power and precision on threading operations. The mechanism can be added to most existing Greenlees at low cost.

### FREE LITERATURE

Learn more about these and many other valuable Greenlee features that make this machine "The Operator's Favorite". Write today for bulletins - ask for Screw Machine Literature.

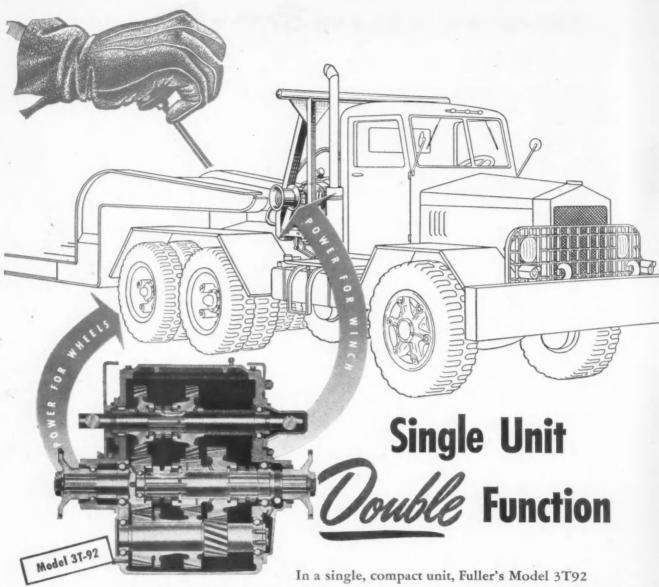


GREENLEE BROS. & CO., 1753 MASON AVE., ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES

AUTOMATIC TRANSFER PROCESSING MACHINES

ES



Auxiliary Transmission combines a full-torque power take-off with a three-speed heavy-duty auxiliary transmission.

Power can be taken off either end of the power take-off drive shaft . . . giving extra flexibility to trucks engaged in rigging or other jobs involving winch work.

Design of the power take-off as an integral part of the transmission case eliminates the inherent disadvantages of a separate, top-mounted power take-off . . . gives extra strength and rigidity.

Model 3T92 is only one of the extensive line of gearedto-the-job and proved-in-the-field Fuller transmissions that assure efficient truck performance.

## FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wisconsin
Western District Office (Both Divisions): 308 Thayer Building, 577 14th Street, Oakland 12, California

M



300 B.C.—Crude elevators like this helped primitive farmers store grain in bins above ground. Hand operation was the rule though animal power, even water wheels, were used.



2 1850—First elevator in America operated between two floors only. Use of elevators got the first big boost in 1890's with the advent of low-cost electricity and better safety devices.



1915—Howell "Red Band" Motors arrived. These rugged, industrial-type electric motors together with safer, stronger, faster elevators ushered in the new era of skyscrapers.

## "GOING UP"-and how!



Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



## HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH. Manufacturers of Quality Industrial Type Motors Since 1915

**Howell Elevator Type Motors** 



Demanded for new trucks

.a requirement for old..

the best brake is AIK



Buyers of new trucks are specifying Bendix-Westinghouse Air Brakes in ever-increasing numbers, because they have learned that these brakes start paying their own way from the first mile. The operators of older vehicles are also following the swing to AIR. They recognize the obvious value of adding that extra margin of modern safety to a vehicle that has already rolled up thousands of miles. On old or new vehicles service costs are less, payloads safely made larger, scheduling more efficient, and driver satisfaction greater. The first mile or the 100,000th—the Best Brake is AIR—and the best Air Brakes are, of course, built by Bendix-Westinghouse.

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY, ELYRIA, OHIO

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An Entirely New Type FRICTION CLUTCH



(Patents Pending)

NOW AVAILABLE FOR MOST TYPES AND SIZES
OF -\* CLEVELAND POWER PRESSES

Recognizing the fact that the successful and efficient operation of a Mechanical Power Press depends, in large measure, on the performance of the Clutch, Cleveland Engineers, after years of careful study, research and experimenting, have designed and developed this radically new, combined Friction Clutch and Brake.

In exhaustive tests conducted over a long period of time, for the purpose of determining the effectiveness of the Clutch and Brake and the "life" of the various parts embodied in its construction, this Cleveland Drum Type Clutch and Brake was subjected to extreme and unusual "punishment" such as: by stalling the slide at mid-stroke, by stopping the slide at bottom stroke under full load and picking it up again without stalling the Press or overheating the Clutch; by reducing the air pressure from the efficient operating pressure of 70 lbs. per square inch to 40 lbs. and operating the Press for a considerable length of time; by running the Press at full line pressure of 100 lbs. per square inch.

During this long test run, and in spite of these "studied" abuses which, as Press users know, are capable of ruining any ordinary clutch in a very short time, this Cleveland Drum Type Clutch and Brake showed little, if any, wear; remained luke warm at all times and did not require any adjusting or servicing. If you are considering the installation of new Power Presses and are interested in uninterrupted production, it will pay you to investigate the advantages of using Cleveland Presses equipped with this new Drum Type Friction Clutch and Brake which is not only different in design, and construction but of more importance, different in performance.

Because the great demand for this efficient Cleveland Drum Type Clutch and Brake has far exceeded our expectations, we are compelled, for the time being, to limit its installation to new Cleveland Presses.

However, we expect to be in a position, very shortly, to supply it as a replacement unit for Cleveland



#### INCLINABLE



- Approximately one-fourth the weight of a conventional disc friction Clutch of equal-capacity.
- Approximately half the number of parts
   of a conventional disc friction clutch.
- Light weight assures considerable seving in horsepower required to operate the Clutch.
- The design and lightness of parts contribute to quicker starting and stopping.
- Complete disengagement of all idle friction surfaces eliminates drag, unnecessary wear and heat, and assures longer friction "life."
- Clutch is self-adjusting which results in easy maintenance and low upkeep.
- Can be serviced readily without removal from the Press.

### ECCENTRIC



- Air cylinders provide maximum performance with minimum amount of air.
- Positive brake brings machine to immediate stop in the event of failure of electric current or air supply.
- Clutch can be set to slip under everlead.
- Clutch temperature remeins slightly above room temperature—ne excessive heating.
- Can be applied to any size new or old Press, flywheel or geared.
- . Is mounted directly on the drivesheft
- B Combined unit of one-piece construction—Clutch and Brake cannot become separated or engaged simultaneously.

### KNUCKLE JOINT



RIES

# Better, faster metal cleaning with these 2 Houghton aids:

FOR OIL-QUENCHED

CERFAK

FOR MACHINED
WORK

HOUGHTO-CLEAN 220

Here is a new, remarkable cleaner for work treated in a salt bath and oil quenched—always a tough cleaning job. It's Cerfak Liquid, and it will clean metal parts in one-sixth to one-tenth the time formerly required in an old-style alkaline cleaning bath.

No hand brushing, no long soaks, and no expensive equipment required. Just heat a 1-to-75 solution to 180-200° F., and run the work through it. You'll be pleased at the amazing results, just as so many others have been.

This is the emulsion-type cleaner which was so popular at the Machine Tool Show last year. It has a high flash point, contains no kerosene, is not toxic or dangerous to use.

For cleaning oily parts in either still tanks or spray-type washers, you'll find Houghto-Clean 220 an outstanding value. It leaves a very slight film which aids in protection against rust, and which need not be removed before applying a final rust preventive. It does not attack the metal. Why not try it now, in your shop?

### E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Philadelphia

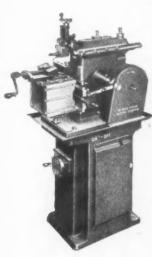


### NO ADVANCE IN PRICES

During the war years, prices in general advanced more than 40%. During the same period, Logan Lathe prices averaged approximately 15% increase, in spite of improvements in design and construction. Our enlarged plant, equipped with the most modern machinery makes for production savings which are passed on to the users of Logan Lathes. That is why even with recent material and labor cost increases, Logan Lathe prices remain unchanged.

Logan Lathe prices start at \$159.50

## LOGAN LATHES SAVE MONEY



LOGAN 7" SHAPER

Price naturally, has a bearing on the lathe you buy. Yet the low Logan price tag is only a one-shot saving. It is multiple, on-the-job savings, as well as price that makes Logan the lathe of true economy.

Logan on-the-job economies result from the way the Logan Lathe is designed and built. For example, due to its ball bearing spindle mounting, the Logan Lathe is ready for any operating speed from 30 to 1450 rpm, with no bearing adjustment. V and flat bed ways are machined to within .0005" of parallelism. Headstock bearing faces are held to an accuracy of .0005". Rugged, massive construction is combined with this accuracy, and vital wear points are protected by self lubricating bronze bearings. Consequently, even after years of constant use, a Logan Lathe retains power for heavy cuts, speed for low cost parts production, and accuracy for exacting tool room work. In many plants, batteries of Logan Lathes handle all medium and small work, saving in power costs, set-up time, and reduced rejects. In any shop, large or small, Logan sustained accuracy and versatility save time, materials, labor and money. See the complete line of Logan Lathes and Shapers at your near-by Logan dealer's, or write direct for catalog information.

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46,000 SPARTON HORNS IN 1914



3,700,000 SPARTON HORNS IN 1947

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Automotive Division • Jackson, Michigan

# "Powered by Novo" means-

- ★ Quick Starting—extra hot spark provided by automatic impulse coupling on magneto.
- \* Friction-Free Operation frictionless taper roller bearings on camshaft and crankshaft.
- ★ Smooth Running—extra heavy flywheel levels firing impulses.
- ★ Speed Regulation—governor maintains speed within 5% despite varying loads.
- ★ Easy Servicing—all wearing parts readily accessible for simple, quick maintenance.

Air-Cooled

One-cylinder, air-cooled models—incorporating many advanced mechanical advantages—range from 4 HP at 1400 RPM to 7.2 HP at 3200 RPM. On model BA-23, either a crankshaft or camshaft drive is available—the crankshaft drive is direct; the camshaft drive, a 2 to 1 reduction.

Novo water-cooled engines are available in two and four-cylinder models. Horsepower ranges from 10.0 at 1200 RPM to 15.1 at 2200 RPM on the two-cylinder, and 22.0 at 1200 RPM to 32.8 at 2200 RPM on the four-cylinder. Design is streamlined with a protective radiator grille-guard.

## Now! Novo Clutches for Many Uses



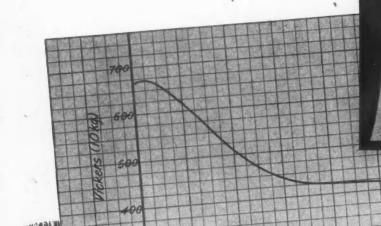
Novo industrial clutches—thoroughly proved in thirty years of use on Novo equipment—are now available as separate units. Well-engineered and precision machined for smooth, even, positive action—these single 6" disc, four toggle clutches easily sustain 100 ft. lbs. torque load. An adjustable, serrated lever and shaft assure non-slip operation—can be installed on either side of the S.A.E. No. 5 housing. A single oiler—easily accessible from the side of the housing—provides positive lubrication for the pilot and outer bearings, and the shifter sleeve. Write for further details.

Novo Engines have been made for 50 Years, Novo Clutches for 30 Years

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For CARBURIZED GEARS ...CAMS...SPLINE SHAFTS use



T.S. 150,800 Y.P. 131,500 El. 15.3% R.A. 50.2%

AISI A 6120 CHROMIUM-VANADIUM STEEL

Distance from surface inch

010

Tough, ductile core for impact resistance—strong, hard case for wear-resistance—firm bonding for close integration of case and core. These essential properties of carburizing steel are obtained to a high degree in AISI A 6120 Chromium-Vanadium steel.

The outstanding core properties are demonstrated by the values (the average or six tests) superimposed on the accompanying macrograph of a gear tooth crosssection. These properties were obtained by the following heat treatment of 1-inch rounds: pseudo-carburize at 1675°, oil quench from pot, and temper at 350° F.

The fine-grained structure of the core, which is char-

acteristic of all vanadium steels, and the firm integration of case and core are clearly shown in the macrograph.

The strong bonding is also graphically presented by the chart, which shows the gradual decrease in carbon penetration from case to core.

The excellent properties of these three—case, core and bonding—make A 6120 Chromium-Vanadium carburizing steel ideal for such vital parts as gears, cams, splines and bearings.

If you have a carburizing problem, our metallurgists will be glad to work with you in reaching a satisfactory solution

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VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17. N.Y. . DETROIT . CHICAGO . CLEVELAND . PITTSBURGH



# RED SEAL SERVICE and RTS KEEP 'EM RUNNING

There's no question about the extra reliability that specialized Red Seal engines provide. But when, after months or even years of dependable service, a Red Seal engine needs a checkup, it's good to know there's authorized service available that the Continental Motors service network is as broad as the nation itself.

Red Seal parts are low in cost because they're manufactured in volume. Regardless of the type of engine — tractor, truck or other — many of the parts are built by aircraft engine methods, to aircraft engine tolerances and precision standards. Wherever you are, there's a Continental dealer nearby, to back you up with complete stocks of parts and with factory-trained service. It's another reason why Red Seal engines have become America's Standard.

Continental Motors Corporation

MUSKEGON



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ARE THE

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FOR A WIDE VARIETY OF PRECISION METALWORKING JOBS.

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SALES ENGINEERS

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FOR HELP

THAT WILL GIVE YOU

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THE BEST

RETURN ON YOUR

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NEW DEVELOPMENTS TO SPEED ACCURATE METALWORKING

PaW JIG GRINDER

All-electric! Grinds holes to "tenths"... matches the precision of P&W's long-famous Jig Borer.



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Mills exact duplicates of masters a utomatically. Mechanically tracer controlled.



### KELLER BG-22

Fastest tracermilling machine ever made . . . with unique allelectric control.



### P&W ROTARY TABLES FOR HORIZONTAL BORING

Permit drilling, tapping, boring and face-milling of all exposed surfaces — regardless of angle — without making set-up changes.



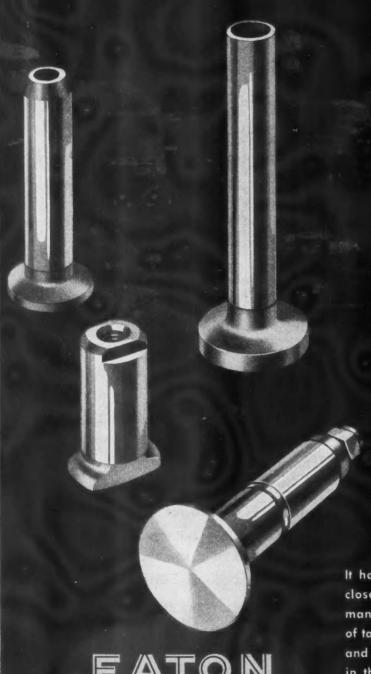
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EATON

It has been Eaton's privilege to work in close cooperation with vehicle and engine manufacturers not only in the production of tappets, hydraulic valve lifters, valves, and other precision engine parts, but also in the design and development of parts which have contributed to improved performance and longer life for internal combustion engines in every field of service.

# TRU-LAY *PUSH-*PULL SOLVES MANY TOUGH REMOTE CONTROL PROBLEMS



ing more freedom in the placement of units or accessories, is a real aid in machine design. Precision-made, this device transmits reciprocal action through a flexible metal conduit with practically no backlash. Input may be either manual or mechanical.

DETROIT, MICH.—New applications for TRU-LAY PUSH-PULL are constantly being found. Originally designed for aircraft manufacturers, its applications have extended into the manufacture of many types of moving and stationary machines.

TRU-LAY PUSH-PULL is made in five sizes. Rated input capacities range from 30 to 1000 pounds. In most cases, terminals and fittings are designed for the individual application.

For specific information, write our Detroit office. Our engineers will be glad to work with yours.



6-235 General Motors Building, Detroit 2 • 695 Bryant Street, San Francisco 7 • Bridgeport, Conn.

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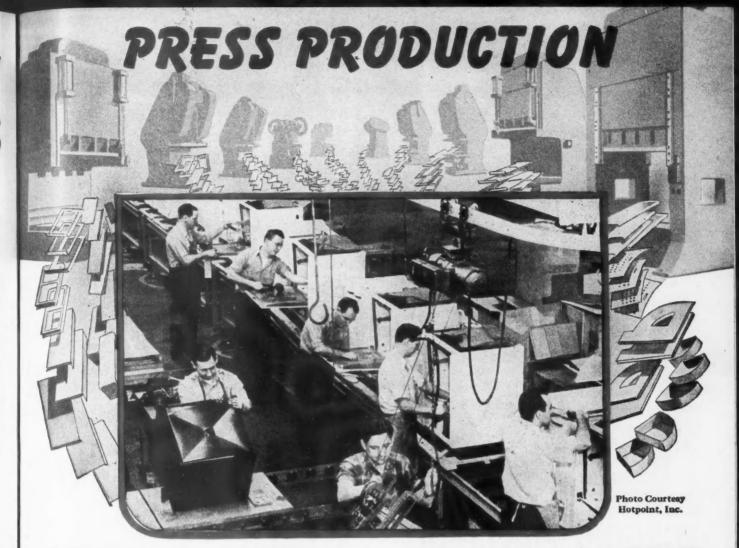
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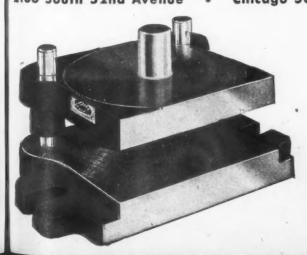
# FEEDS THE ASSEMBLY LINE

The Assembly Line—symbol of American Mass Production—depends on a rapid and constant flow of finished parts to each stage of the assembly.

Largely responsible for keeping the line moving, Presses provide the fast, all-around production of duplicated metal parts that modern standards of production demand.

Danly Die Sets—a necessary part of good Presswork everywhere—speed die making programs, protect costly dies, cut down time for regrinds. Danly Die Sets and Die Makers' Supplies are nationally recognized for known dependable accuracy.

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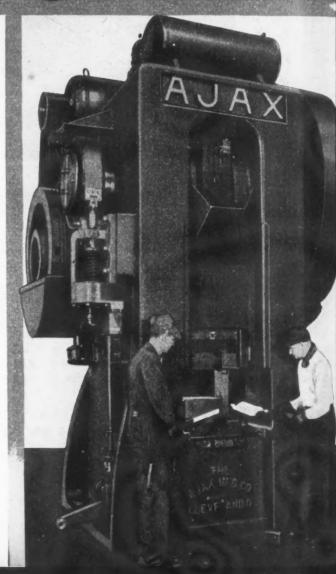
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### For most efficient FORGING PRODUCTION

 Forging production efficiency is constantly becoming more vital to successful Forge Shop operation. Obsolete machinery or lack of the best machines for the work being produced is very often costly.

Ajax Forging Machines, Forging Presses and Forging Rolls are built on a basis of mechanical soundness embodying many exclusive, patented mechanical features. In the design and construction of this line of machinery, the recognition of the need for greater operating speed, greater ease of operation and a higher degree of accuracy in forging output, is constantly a guiding factor.

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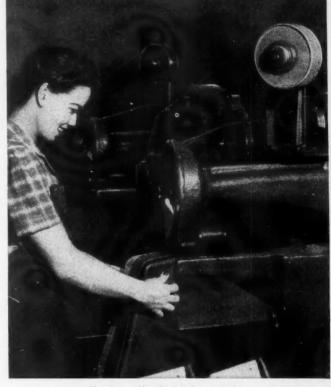
No pre-punching required. Replace rivets, screws, nails, bolts, spot-welding with wire stitches

Yes, sir, Acme-Morrison Metal Stitchers make stitches that Granny never dreamed of ... stitches that save you time and money because they speed production, reduce material costs and eliminate costly operations.

Acme-Morrison Metal Stitchers fasten metal to metal, or non-metallic materials to metai.

The secret is a wire stitch which works like your office stapler. In a single operation this machine forms its own stitch (or staple) from a coil of wire, drives and clinches it. No pre-punching is required.

The Acme-Morrison Metal Stitchers come in



Acme-Morrison Metal Stitcher stitching together composition board and impregnated fibreboard. A steel support is also stitched to this assembly.

several models and can be used advantageously in many industries. They will stitch aluminum, steel, copper, brass, bronze, certain grades of stainless steel, cork, asbestos, rubber, wood, canvas, and other materials.

For further details about what these time-saving, money-saving Metal Stitchers can do for you, mail the coupon today.

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### ACME STEEL COMPANY

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A metal-to-metal stitch looks like this



A few of many combinations



Textile stitched to aluminum



Aluminum, leather and copper stitched together



Aluminum, plywood and brass stitched together

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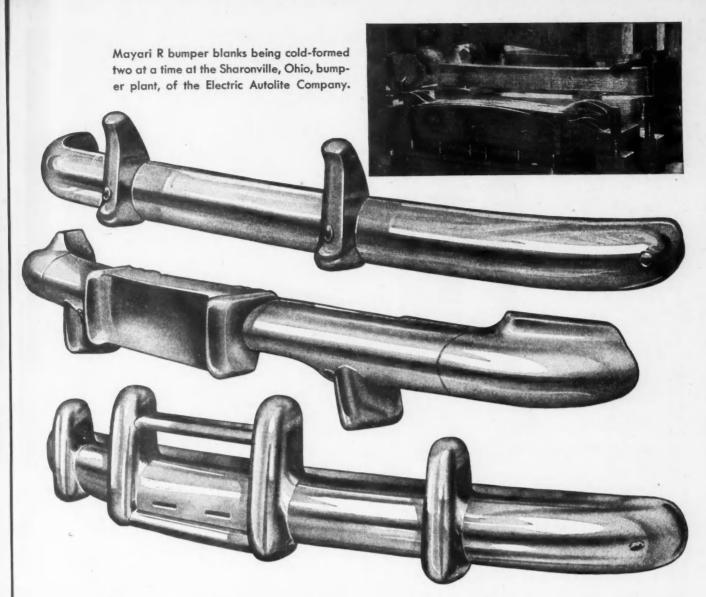
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## Modern Bumpers of Mayari R

First used successfully in 1946, bumper sections of low-alloy, high-tensile Mayari R steel are now standard equipment on several makes of automobiles.

Service-wise these bumpers are doing an outstanding job. The higher mechanical properties of the steel make it an excellent material for this type of application.

Production-wise the bumpers are simple to manufacture. Uniform properties have been developed in Mayari R to make it suitable for high-speed, cold forming. It takes the intricate shapes used for modern wrap-around bumper sections.

Aside from this use, substantial tonnages of Mayari R are being used for truck, trailer and bus frames; for body members, panels and many other parts where weight-savings, increased strength, or corrosionresistance are important considerations.

For additional information on this versatile steel write or phone the nearest Bethlehem sales office for Mayari R catalog 209.

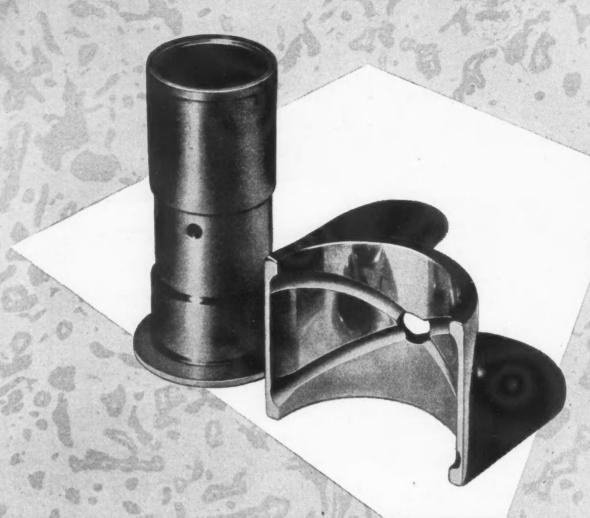
#### BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation Export Distributor: Bethlehem Steel Export Corporation





Mayari R makes it lighter stronger longer lasting



Basic principles of tubrication govern the performance of sleeve bearings. Proper application of those principles and the innate quality of Bunting Bronze Bearings give assurance of successful operation in service. The wide experience of our engineers is at your disposal. THE BUNTING BRASS & BRONZE COMPANY, Toledo 9, Ohio.

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that's Tooling Economy!

This American-designed broaching job achieves real tooling economy. One master fixture and nine easily interchangeable inserts are used on an American SB-48-15 single ram surface broaching machine with receding work table. Thus equipped, the machine broaches the king pin boss on nine different automotive steering knuckle supports. Taper wedge adjustments are used behind the broach sections to accommodate variations in the length of the king pin boss on the parts.

Top: Straddle breaching the lug en automotive steering knuckle supports. The operator loads part over two locating pins, manually clamping to maintain location and alignment. The entire locating assembly is then brought forward and clamped down-against a solid support under the broached boss. Center: The nine broached parts, the master fixture, and the nine interchangeable inserts which adapt to the master fixture. Bottom: American SB-48-15 single ram surface broaching machine tooled for broaching nine different automotive steering knuckle





A new circular gives complete details and specifications en American surface broaching machines. Write for your copy today. Ask for Circular 300 G

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### How should you select a supplier of quality Aluminum?

All you need do is ask: Who are the users of a particular brand of aluminum? How has it performed for them?

Ask that of Kaiser Aluminum and you get this answer-

Though on the market less than two years, Kaiser Aluminum is being used by thousands of manufacturers. By leaders in aircraft, refrigeration, appliances, building materials, air conditioning, and scores of other industries.

What do they think of the performance of Kaiser Aluminum? The record speaks for itself. The demand for Kaiser Aluminum increases every day, from new customers as well as old.

These manufacturers have learned that the quality of Kaiser Aluminum is controlled every step of the way, from bauxite processing to finished product. What's more, they know it consistently meets the most exacting specifications, whether the emphasis be on drawing properties, tolerances, finishes, or surface appearance.

You, too, should specify Kaiser Aluminum for your operations. When you do, you'll be assured not only of *consistent* quality, but also of dependable deliveries. You can plan production schedules with the knowledge that Kaiser Aluminum will arrive on time.

Call in a Permanente engineer today—he can quickly show you how Kaiser Aluminum can benefit your operation most effectively.

# Kaiser Aluminum

### A Permanente Metals product

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# SCHWITZER-DMPANY... pecialists

TOO MUCH?

HAVE YOU A DAMPER PROBLEM? DOES YOUR ENGINE PERFORMANCE SUIT YOU OR ARE YOU PAYING

We can build a damper of superior efficiency to control the torsional vibration in your particular engine and so simple in design and so saving in weight as to importantly reduce your outlay for dampers.

Schwitzer-Cummins' tuned rubber type dampers are adaptable to any size or type of internal combustion engine-gasoline or Diesel, large or small, two cycle or four cycle. They possess unusual flexibility and lightness. If quantities justify, stampings can be used exclusively. On smaller quantities the design lends itself excellently to the use of simple uncored, light weight castings. The rubber member is completely confined mechanically, its compound is individually selected for the particular application—both necessary features for the highest degree of vibration absorption and long usage. We also manufacture dampers of the sliding friction type.

Many large engine builders have placed their damper problems in our hands and profited accordingly through improved performance and a saving of money. For 30 years we have been supplying the country's fine engine builders with oil pumps, water pumps, superchargers, cooling fans, automatic shaft seals and vibration dampers. We invite your inquiries.

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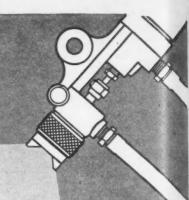
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for Acme liquid compositions...



## Now exclusively distributed by H-VW-M

Improves Buffing —Lowers Costs

Profit from the advantages of spray application of liquid buffing compounds with equipment planned for that purpose. Eclipse *Pressure Feed* Spray Equipment for use with liquid buffing compositions is now exclusively distributed by Hanson-Van Winkle-Munning Company.

Equipment is available in single or multiple units for use with your present buffing equipment. Operation can be manual or fully automatic.

Thoroughly tested in actual production, Eclipse pressure-type spray application of oil base liquid compounds—such as Acme Tripoli—has proved highly efficient and economical.

Whether manually or automatically operated, Eclipse Spray Guns leave operator's hands free for uninterrupted production, increase buff life, simplify cleaning after buffing, and save appreciable composition ... contribute in all to better buffing at lowered costs.

H-VW-M is prepared to supply complete installations and service. Standard equipment includes gun, five-gallon pressure container, foot pedals, necessary length of air and fluid hose and accessories. Write for details. For best results, the following grades of Acme Liquid Compositions are recommended for use with pressure type spray equipment:

### GRADE CHARACTERISTICS

- 2-L-70 Double duty cutting with superior color.
- 2-L-77 Good cutting with medium color.
- 2-L-79 Heavy cut with medium color.
- 4-1-10 Coloring composition for: nickel, brass, copper, aluminum, die castings.





### HANSON-VAN WINKLE-MUNNING COMPANY

MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing equipment and supplies

Plants: Matawan, New Jersey • Anderson, Indiana
Sales Offices: Anderson • Chicago • Cleveland • Dayton • Detroit
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AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

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AMERICAN III TYPES

PHILLIPS Screws

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ALL TYP



Remember the days when you used a trusty pea-shooter to disrupt Miss Mulligan's English class? That Air Tool really did the job, didn't it?

Modern industry depends upon many Air Tools, only this time they are air-powered screw drivers—impact wrenches—grinders—chippers—riveters—hoists and drills—they do a better job. Ingersoll-Rand Air Tools are the first choice of production-wise men because they are lighter—faster—smaller—smoother—safer—more powerful—sturdier.

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### IT'S FOUR BIG CATALOGS IN ONE!

**Standard tools**—This 64-page catalog lists single-point tools in *hundreds* of sizes and styles. They can fill up to 80% of your machining requirements. You'll find the new catalog well arranged for easy reference.

**2 Standard blanks**—The catalog suggests lots of uses for the many blanks it lists. Use them for cutting-tool and wear-resistant jobs. Most-used styles and sizes are locally stocked in industrial areas for prompt delivery.

3 Wear-resistant parts—A surprising range of wear-resistant uses for Carboloy. Some of the 100 examples illustrated might help you to some money-saving application of this low-cost, long-life miracle-metal in reducing wear on your machine parts or products.

**\$ Specialties**—Now, unique uses for Carboloy make lots of jobs easier and faster. The new Carboloy catalog illustrates some specialties already available.

Most sizes and styles of standards are stocked by authorized distributors in 82 cities from coast to coast.

### Mail the coupon today!

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Please send me t	he new,	64-page	Carboloy	Catalog	GT-200.
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### EXTRA LIGHTS ON

TRUCKS and extended runs at night put a heavy strain on generators. The American Bosch Special Service Volt-O-Matics are designed and built to deliver dependable service under this type of punishing operation.

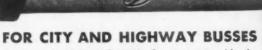
### ON POLICE CARS

American Bosch Special Service Generators provide adequate output for the efficient operation of radio receivers and transmitters, lights, sirens and accessories while standing by or prowling at reduced speeds.



### TWO-WAY RADIO EQUIPPED TAXIS

need the low-speed output of an American Bosch Special Service Generator when waiting for calls or cruising slowly in traffic.



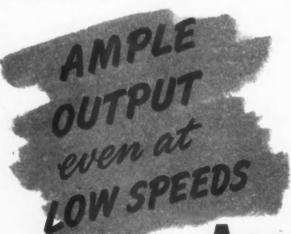
American Bosch Volt-O-Matic Generators provide the answer for a high output, reliable electrical supply at all practical speeds and under heavy operating conditions.



### DOOR TO DOOR DELIVERY means

long idling periods and only short runs for charging between stops. And here again is another application where American Bosch Volt-O-Matic Generators are tops.





Rugged American Bosch Special Service Volt-O-Matic Generators are skillfully engineered and precision-built for top performance. They cut in at speeds as low as 550 generator RPM and reach full output quickly—without the application of pulleys too small for proper belt traction. American Bosch Volt-O-Matics are available in both 6- and 12-volt capacities with fork, hinge, flange and cradle mountings for easy installation. Ask your supplier for complete details or write direct: American Bosch Corporation, Springfield 7, Massachusetts, U.S.A.

AMERICAN BOSCH
Volt-o-matic Generators





If you require quality drop forgings, in quantities of thousands or millions . . . Herbrand is an excellent source of supply. The latest, most modern equipment and machinery are used in the production of these precision forgings. Enduring stamina is built into Herbrand forgings through scientific heat treating by definite process in the latest automatically controlled furnaces. Exact inspection by skilled men assures forgings free from defects. Your inquiries are solicited.

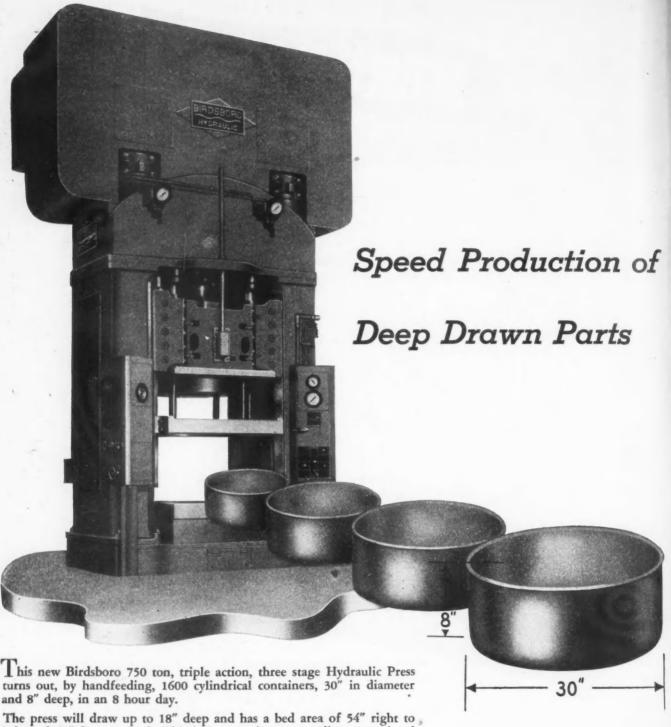


#### HERBRAND DIVISION

THE BINGHAM-HERBRAND CORP., FREMONT, OHIO

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turns out, by handfeeding, 1600 cylindrical containers, 30" in diameter and 8" deep, in an 8 hour day.

left, and 60" front to back. This is just another outstanding example of Birdsboro engineering at work. Our engineers will be glad to work with you on any press problems that may confront you now or in the future.

This versatile press is equally suitable for single and double action drawing operations, as well as blanking and coining. It is also available with built-in equipment for BULGING by "hydraulic pressure."

Agents in: Chicago, Illinois—Cincinnati, Ohio—Detroit, Michigan—Los Angeles, California—St. Louis, Missouri—Tulsa, Oklahoma.

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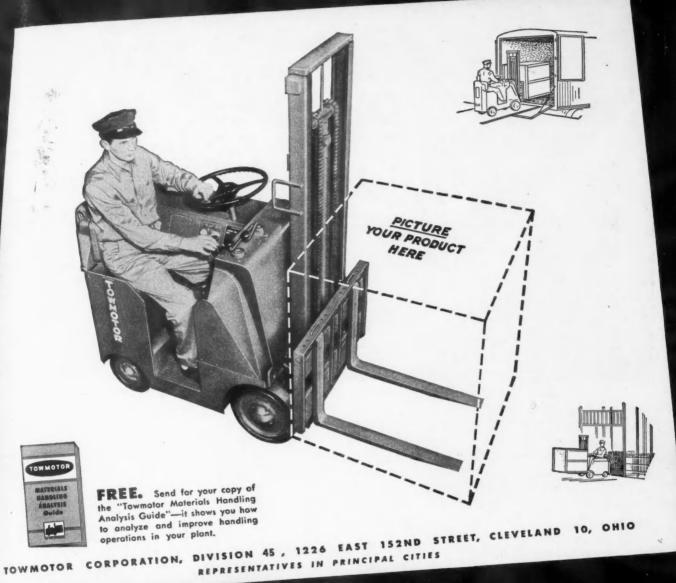
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Designers & Builders of: Steel Mill Equipment • Rolls • Special Machinery • Crushing Machinery • Steel Castings • Hydraulic Presses

# You Need

\*M H is MASS HANDLING - the systematic movement of the most units, in the shortest time, at the lowest cost.

#### to SAVE TIME!





Fork Lift Trucks and Tractors

#### WHY BUILD A NEW PLANT

when you can modernize your present handling methods and streamline production operations with Towmotor Mass Handling? Towmotor Fork Lift Trucks, Tractors and Accessories will insure the most efficient use of present production equipment, manpower and space. Learn now how a versatile Towmotor can save time by speeding up handling operations in your plant.

RECEIVING PROCESSING STORAGE DISTRIBUTION



These standard lengths of Inland-made Delco Brake Hose—taken at random from the production lines—are getting the "whip" test. The couplings at one end are fixed. Those at the other end are rotated in a circle 8 in. in diameter at 800 r.p.m. During test liquid pressure in each hose is maintained at 225 to 250 lbs. per sq. in. Test runs vary, up to a maximum of 80 hours. The "whipping" effects greater displace-

ments at higher rates than are encountered in actual automotive service. Flexing 48,000 times per hour, the hoses experience fatigue strains equivalent to many years of use on passenger cars or trucks.

The hose also gets a 6000-lb. burst test—from four to six times maximum

usage pressures. And there are similarly severe coupling and expansion tests.

Only Inland makes both hose and fittings as one unit-designed job. That, with tests like the above, is your guaranty of safety, service and salability in Inland-made Delco Brake Hose. Be sure to specify it as original equipment.

INLAND MANUFACTURING DIVISION
General Motors Corporation DAYTON, OHIO

BRAKE HOSE by MANUFACTURING DELAND

In addition to everything else a good Direct-Acting Shock Absorber should be,

#### HOUDAILLES\* are



This unretouched photograph of a cut-away section shows that even when the rod of a Houdaille Direct-Acting Shock Absorber is bent to an angle of 90°, the super-tough weld between it and the attachment ring shows no tendency to break or fracture.



HOUDAILLE builds the Houdaille Direct-Acting Shock Absorber . . . and only America's pioneer hydraulic shock absorber manufacturer with its long years of engineering experience and its rigid standards of precision workmanship could be expected to produce such a fine instrument. Any automobile manufacturer can adopt these new Direct-Acting Houdailles with the utmost confidence that they will give his owners a better ride for more miles.

"foo-dye"

#### HOUDAILLE-HERSHEY CORPORATION

HOUDE ENGINEERING DIVISION

Makers of Hydraulic Controls
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#### THERMALLOY HEAT TREAT

#### LAST LONGER

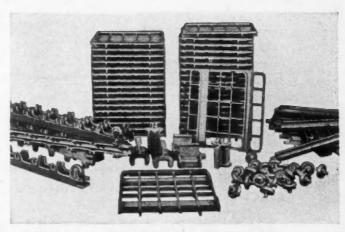
You can't serve up low-cost heat-treated parts with high-cost trays. And it isn't the initial cost of a tray that determines its value. It's the cost per hour on the job.

Right there—cost per hour on the job—is where you can convince yourself that Thermalloy trays can save you money. They last longer.

They last longer because Thermalloy is the alloy developed specifically for heat-resistant jobs—the alloy that has been proving itself in every conceivable type of furnace—for trays of all sizes, weight and form.

Electro-Alloys has scores of stock patterns waiting and ready to meet your requirements promptly. Or—if yours is a special application—our engineers and metallurgists are prepared to design special trays to meet your individual problem.

Before you place another order for trays, call Electro-Alloys. Ask one of our engineers to show you how Thermalloy can save you money.



#### Thermalloy Ups Production 28%

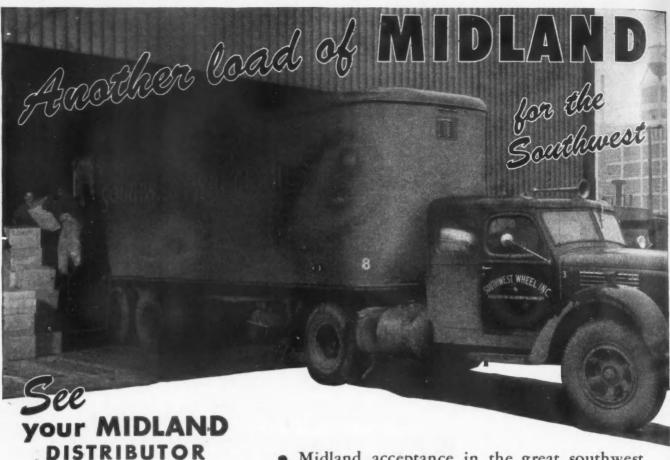
Here's a case history:

A producer needed more production without increasing his heattreating capacity. Electro-Alloys engineers designed a new tray our metallurgists specified the alloy. Result—28% increased production with the same heat-treating capacity. Design was largely responsible, but it paid this manufacturer to call Electro-Alloys. Maybe it will pay you, too. Thermalloy for the heat treat includes: MUFFLES • RETORTS • BASKETS • FIXTURES • CHAIN • POTS



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POWER BRAKES
in AIR or VACUUM
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2-SPEED AXLE CONTROLS
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• Midland acceptance in the great southwest necessitates a constant flow of parts and products from the great Midland factories. And this typifies the demand for Midland from all sections of the country,

This evidence of superiority and service

recommends Midland to you. Consult the list of products at the left—then see your nearest Midland Distributor about your needs. Or write, phone or wire direct to us in Detroit.



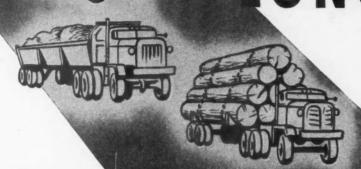
#### THE MIDLAND STEEL PRODUCTS COMPANY

6660 MT. ELLIOTT AVENUE . . DETROIT 11, MICH.

Export Department: 38 Pearl Street, New York, N. Y.

## MIDLAND POWER BRAKES





# LIPE

MULTI-LEVER HEAVY DUTY

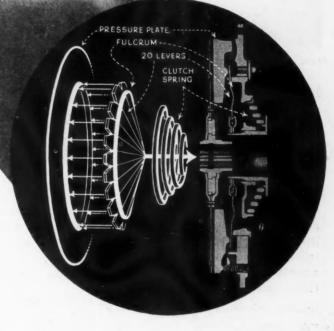
#### **CLUTCH**

Easy removal of shims restores full clutch capacity

As the friction material on the Driven Disc Assembly wears down, the simple removal of shims from the Cover Plate Assembly restores maximum torque capacity of the Lipe Multi-Lever Clutch.

#### Less Maintenance—Fewer Lay-ups

The Lipe ML Clutch uses only one pressure spring. When clutch is engaged, every part of the Driven Disc facing area is contacted at same instant with uniform pressure. This assures many more smoother engagements — without shock loads — during the lifetime of friction material.



The 20 louvred pressure-equalizing levers act as a high-speed fan to circulate air around pressure plate. Hence, the Lipe ML Clutch runs cooler.

Use the Lipe Multi-Lever Heavy-Duty Clutch in Busses, Trucks, Tractors, Off-the-Road Units for MORE HOURS ON THE JOB WITH LESS MAINTENANCE.



Tree

The Lipe Service Manual with complete details on the Lipe ML Heavy-Duty Clutch

Like-ROLLWAY CORPORATION

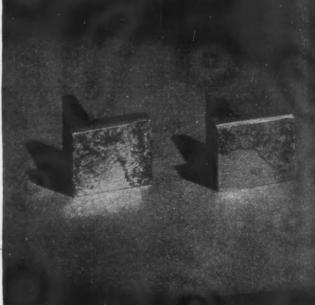
SYRACUSE 1, N.Y.

Cable Address: LIPEGEAR

# They're made of Mallory D-54\*

FACE VIEW





SIDE VIEW

If you have an application that requires non-sticking, low contact resistance at high currents, we suggest Mallory D-54 as a well-proved metal for the job.

Mallory D-54 metal is a contact material of silver and cadmium oxide. Its electrical conductivity is very high and, at the same time, it has non-sticking properties. Operated continuously over long periods, it maintains a low contact resistance and shows practically no material loss. Its price compares favorably with that of silver itself.

Because of these reasons, D-54 is widely used in industrial electric truck contactors, motor starting contactors ... that's why they operated over 150,000 times with practically no wear

and industrial relays and switches.

The contacts you see above are faced with a ½" thickness of D-54 and were used in an industrial electric truck. After more than 150,000 makes and breaks, they are practically as good as new. This performance is quite typical of D-54. We'll be glad to tell you more about D-54—glad to contribute engineering assistance also.

IT'S 5000 TO 1 THAT A MALLORY STANDARD CONTACT
WILL MEET YOUR "SPECIAL" REQUIREMENTS

\*Reg. U. S. Pat. Off.

# MALLORY ELECTRICAL CONTACTS & CONTACT ASSEMBLIES

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA



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#### (Above

Complete ordering information on the Mallory line of Contacts and Contact Materials will be found in this catalog.

#### (Below)

The Mallory Contact Data Book contains everything you want to know about contact design, construction, application and materials. Free to engineers who write on company letterhead. \$2.50 to others.

# SUPERIOR

# ABRASION

# RESISTANCE

Parts made from HYCAR synthetic rubber have 50% greater abrasion resistance than parts made from natural rubber. That means they'll last longer, give more dependable performance in the most severe service, and save maintenance and replacement time.

But that's only one of HYCAR's unusual and valuable properties. Examine the list in the box at the right. Think of these properties in terms of your requirements of rubber parts. Realize that these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part.

We have developed more than 5000 recipes for HYCAR compounds—each compound engineered to do a certain job. If you're looking for rubber parts that will give long life, dependability, and economical operation, specify HYCAR.

Ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Department HD-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

#### CHECK THESE

#### SUPERIOR FEATURES OF HYCAR

- EXTREME OIL RESISTANCE insuring dimensional stability of parts.
- 2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hat eil.
- 3. ABRASION RESISTANCE—50% greater than
- 4. MINIMUM COLD FLOW—even at elevated temperatures.
- 5. LOW TEMPERATURE FLEXIBILITY down to —65° F.
- 6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
- 7. AGE RESISTANCE—exceptionally resistent to checking or cracking from exidation.
  8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
- NON-ADMERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hyear

American Rubber

B. F. Goodrich Chemical Company

GEON polyvinyl materials . HYCAR American rubber . KRISTON thermosotting resins . GOOD-RITE chemicals

# non-repeat clutch

W AVAILABLE

TENNE PRESSES

DIAGRAM OF NON-REPEAT MECHANISM

Arrow points to lock bolt in non-repeat position. Operator can quickly reverse bolt 180° (dotted line), thus permitting press to operate continuously while pedal is down.

The Non-Repeat Clutch mechanism—an exclusive Federal feature—is now standard on all Fed-

eral Presses. It is simple in construction, yet positive in action. Regardless of how slowly or quickly the clutch is depressed, the press will not repeat accidentally. To engage or disengage the mechanism, the operator need not move from his working position or use any tools. His only action is a mere flick of the finger.

This and other features have earned for Federals an enviable reputation throughout the metal-working industry—a reputation of increasing production, eliminating accidents, cutting costs. Federal Presses may help to solve your production problem. Write today for new catalog. The Federal Press Co., 348 Division Street, Elkhart, Indiana. Telephone 2831.

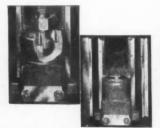
#### OTHER FEDERAL COST-CUTTING FEATURES



All Federal Presses may be reclined from the front adjustment made quickly and easily by one man. Lock bolts hold press in desired position.



Knockout bracket is anchored to frame. Result: no danger of misalignment due to knockout bar im-pact. This reduces time out for adjustment, cuts costs.



The ram on Federal Presses is symmetrical, giving equal distribution of weight and balance; it is bored in exact alignment with "V" ways. Such careful construction adds to accuracy, speed and efficiency of press.

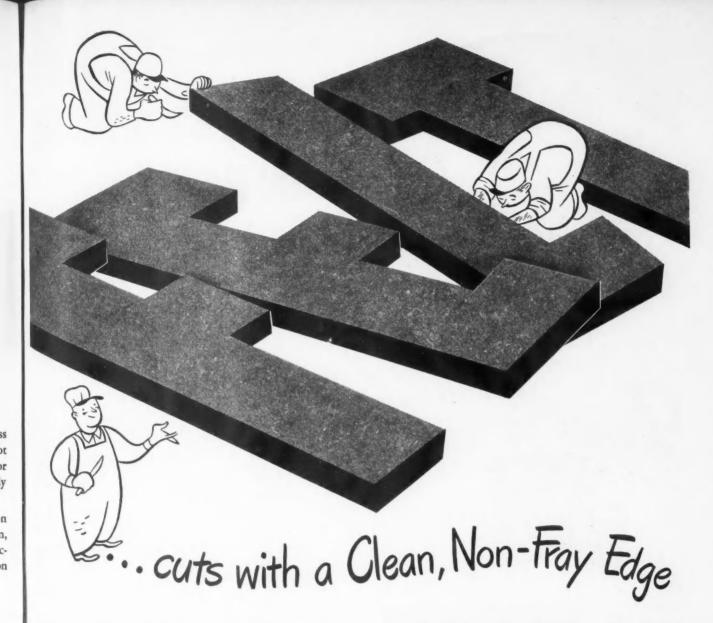


Shock from thrust and reto frame—no strain on bearings and caps. Brakes (spring tension) are quick-ly, easily adjusted.

FEDERAL Openback PRESSES

Available in 8 sizes-Capacity 6 to 80 tons.

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Felt can be processed from the softness of down to the hardness of seasoned board — and to any of the wide range of consistencies in between.

You can tool felt in many ways . . . die-cut, punch, skive, chisel, turn or scarf . . . and you can obtain a high degree of clean edging and close tolerance.

Felt retains resiliency through long, tough usage. Its breaking point is high.

Felt is not injured by normal atmospheric conditions . . . sun, moisture, heat, cold . . . nor by exposure to gas and oil.

Because of these desirable utility factors, and many others too, design men call upon felt more and more to fill the bill where a basic material of its versatility is required.

> Feiters Precision Cut Feit Parts Manual makes ordering easy, sure. Ask for your copy today then keep it ready at hand.

When ordering, remember that cut felt parts as supplied by The Felters Company are uniformly and accurately cut to your *exact* size and shape specifications — thus, they are usually ready for assembly after a single, elementary operation. This means a substantial saving in time and money for you.

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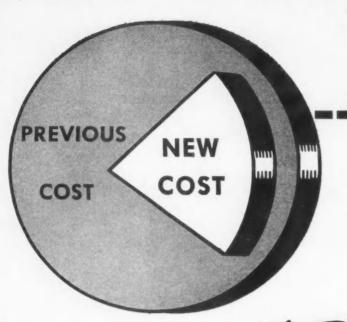
#### FELTERS

COMPANY

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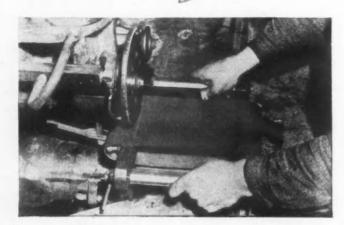
Offices: New York, Philadelphia, Chicago, Detroit Sales Representatives: San Francisco, St. Louis

Makes the Felt Cuts for the Farts it Cuts



# RESISTANCE WELDING DID

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At Heywood-Wakefield, for instance, redesigning of the coach seat pedestal for assembly by resistance welding had the following results:

- The Progressive Seam Welder paid for itself in the first few weeks of operation.
- 2. Since then it has been saving enough to pay the wages of 10 other H-W workers on other jobs.
- 3. A higher quality seat pedestal was produced.

You'll find the story of how this was done along with "How 33 operations were cut to 5"; "Simple machine makes petcock wrenches faster"; "How to resistance-weld without heavy duty power lines"; and "How to design for projection welding", in

RESISTANCE WELDING PICTORIAL #50
Ask for it, today.



PROGRESSIVE

Velder Co.

CABLE ADDRESS "PROGWELD"



RESISTANCE WELDING EQUIPMENT

90% of all ELWELL-PARKERS sold since 1928 are still going strong!



• This fact is ample evidence that E-P trucks offer you the maximum in sound design and quality construction.

Another fact: Elwell-Parker's 42 years' experience in the industrial truck field is unequalled—consequently, our application knowledge is greater and more varied.

AND, Elwell-Parker does far more than merely supply 47 basic models—it "tailors" them to your specific materials handling condition. Already this individual engineering has been profitably applied in over 300 branches of industry.

Many basic truck attachments pioneered by Elwell-Parker—such as sideshifting and pushoff

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WHAT DOES ALL THIS ADD UP TO? In durability, engineering experience, versatility, improved design, and services of the man on the job, Elwell-Parker offers you more per dollar invested in industrial power trucks. THE ELWELL-PARKER ELECTRIC COMPANY, 4533 St. Clair Avenue, Cleveland 14, Ohio.



Free Booklet on Scientific Materials Handling

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Established 1893

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It's a "Natural" for

SPEED, STRENGTH and SMOOTHNESS.



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#### **OPEN-HEARTH SCREW STOCK**

As specialists in the manufacture of Cold Finished Bars, BLISS & LAUGHLIN, INC., produce a superior free-cutting grade of Open-Hearth screw stock that cuts with panther-like speed and smoothness on modern automatic screw machine equipment.

Special quality sulphurized grades of Open-Hearth Steels, processed in B&L mills by controlled methods of cold finishing and furnace treating assure an ideal combination of machinability, toughness and service life. It all "adds up" to higher production, better parts and lower fabricating costs.

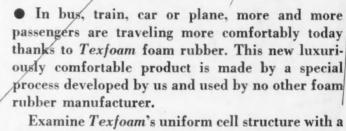
# BLISS & LAUGHLIN, INC.

General offices: HARVEY, ILLINOIS

Ints: HARVEY, ILL. • BUFFALO, N. Y. • MANSFIELD, MASS.







Examine Texfoam's uniform cell structure with a magnifying glass. Squeeze it in your hand and see how quickly it springs back into shape. Blow a puff of cigarette smoke through it and check its porosity. See how freely it breathes in use—a skin-soft, cool, comfortable upholstery filler.

For whatever upholstery purpose you have in mind, write today for samples and full information on *Texfoam*. Our engineers are ready to work with you, at no charge, in developing exactly the right size, shape and density to meet your requirements. Sponge Rubber Products Co., 101 Derby Place, Shelton, Conn. Sales offices in principal industrial centers.



Trade Marks Reg. U.S. Pat. Off.

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UNION PACIFIC RAILROAD COMPANY

F. ASHBY.

To American Industry:

The Union Pacific West offers industry proximity to products of ranch, mine and forest...ample power, fuel, water...healthful living conditions in scenic, recreational regions...and native-born, high-type labor. Our faith in the future of this vast territory is confirmed by our current 200million-dollar investment program for new equipment, improved and expanded facilities to provide shippers and travelers with the utmost in rail transportation. We are at your service.

Yours very truly,

Union Pacific Railroad President.



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George F. Ashby

\* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

> \*Address Industrial Department, Union Pacific Railroad Omaha 2, Nebraska

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Road of the Daily Streamliners



 $M_{\text{ore than you might expect.}}$ 

New, sprinkler-type irrigation systems made with Reynolds Aluminum are portable because they're lighter. Being portable, less pipe is needed to irrigate wide areas. And the farmer can spot his system to meet requirements.

It proves again that Reynolds Aluminum usually does the job better . . . at lower cost. Just as it does in the case of transportation equipment, where the easyworking, easy-handling qualities of aluminum shapes and sheet have cut costs. Or the host of screw machine products made from free machining Reynolds Aluminum bar stock.

Aluminum's advantages are not reserved for premium products alone. Pound for pound, aluminum gives you

three times more usable metal than copper, brass or steel. There is also a saving in every step of your production process because lightweight aluminum handles and works faster. In many cases, its pleasing natural color avoids additional costly finishing. Then, too, every pound saved in the weight of the finished product is reflected in lower shipping costs.

So why not Consider Aluminum—Consult Reynolds. For complete information contact your nearest Reynolds Field Office or write Reynolds Metals Company, 2513 South Third Street, Louisville 1, Ky.



The base price of aluminum bas been reduced 30% since Reynolds became a primary producer.



### REYNOLDS [ifetime ALUMINUM]

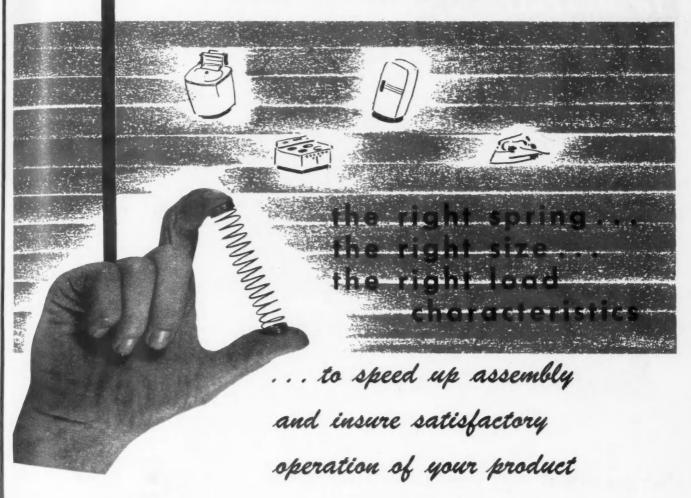
REYNOLDS MADE ALUMINUM COMPETITIVE - TAKE ADVANTAGE OF IT



A. SCHRADER'S SON, Division of Scovill Manufacturing Company, Incorporated, BROOKLYN 17, NEW YORK

World's Largest Manufacturer of Tire Valves, Gauges and Accessories

### ... At Accurate



Production conscious Accurate engineers know the importance to you of having all your springs exactly right. They know that uniform springs which precisely meet your specifications simplify and cut losses due to rejects. Write for details, today.

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#### the symbol of quality and skill

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We have from year to year adopted new and improved methods and every man and woman in our organization is sincerely impressed with a clear understanding that wherever our trade mark appears it is the symbol of quality and skill.

#### O. L. ANDERSON CO. Inc.

MANUFACTURERS OF

FUEL TANKS and SHEET METAL STAMPINGS
FOR THE AUTOMOTIVE INDUSTRY

STEEL SUB-ASSEMBLIES . SAMPLE WORK . ENGINE COWLINGS

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#### GOOD BABBITT, AND ALL THIS TOO!

In Federated babbitt you get the exact metal you specify, PLUS all these intangible ingredients. These background factors mean service and security...they mean that you get *consistently* better babbitt to help you do a *consistently* better job.

For any bearing metal—"XXXX Nickel" and "Thermodyne" tin-base babbitts for heavy bearing loads; "Merit" metal and "Record" lead-base babbitts for lighter

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STOP Vibration Noise

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#### SOUND DEADENERS

Eliminate vibration, thus providing panels which sound solid, not "tinny." Used on automobiles, trucks, busses, metal furniture, kitchen cabinets, etc.

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Reduces vibration, prevents rust, seals cracks and seams, insulates against heat and cold, and acts as a cushion against vibration.

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For use in sealing joints—either metal to metal or glass to metal. Make cars water and weather proof.

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### Sturdy CONSTRUCTION Unusual CONVENIENCE Neat APPEARANCE.



"Hallowell" Ready-made Work-Benches are avail-able in a number of stand-ard heights, widths, and lengths.







"Hallowell" Deluxe Work-Bench of Steel. With back-board, two three-drawer tiers, intermediate shelf and bottom shelf.

SHOP EQUIPMENT OF STEEL

#### . . . Built to Meet Practically **Every Plant or Shop Requirement**

"Hallowell" Ready-made Shop Equipment of Steel is hitting an all-time high in industry. It's sturdy, all-steel and fire-resistant construction with welded or hydraulically riveted joints means years of service life and reduced fire hazard. We make a very complete line of steel shop equipment - such as: Work-Benches, Tool Stands, Chairs and Stools, Foreman's Desks, Trucks, all of sturdy construction and neat appearance.

Ask for your copy of the "Hallowell" Steel Shop Equipment Catalog - very informative and interesting, as are both prices and deliveries.

> "Hallowell" Products are sold entirely through Industrial Distributors.

> > OVER 45 YEARS IN BUSINESS



Fig. 200 M. H. B.

"Hallowell" Steel Stool. Steel seat covered with Masonite Tempered Presdwood. Plywood hinged-type. backrest,

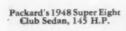


Fig. 1855

"Hallowell" Extra Heavy Tool Stand. With or without drawers or casters.

JENKINTOWN, PENNA., BOX 611 . BRANCHES: BOSTON . CHICAGO . DETROIT . INDIANAPOLIS . ST. LOUIS . SAN FRANCISCO

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# Fackard knows

the importance of engine bearings in fine car performance!

#### FEDERAL-MOGUL ENGINE BEARINGS

Packard Motor Car Company has been a valued bearing customer of Federal-Mogul since 1924. In the new, ultra-beautiful 1948 Packards, the engines again use Federal-Mogul bearings.

Today, higher compression ratios, temperatures, r.p.m. and power output all make

more critical demands upon engine bearings. These demands are met by Federal-Mogul engineering and research. Our new sintered copper-lead bearings, as supplied to Packard, are typical of Federal-Mogul's answer to the challenge of new efficiency and performance standards.

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Power goes to work smoothly through

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#### FURNISH THE STEEL

. . . if you can supply us with 12 to 24 gauge sheet steel, we will buy the steel from you and ship pound for pound:

-Lyon standard products-any selection of items in production at regular published prices-see partial list below

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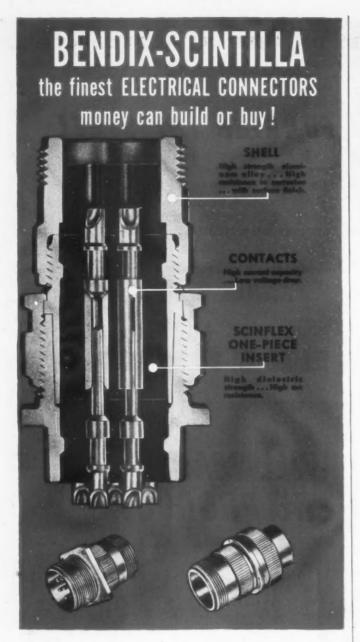
- Wood Working Benches Hanging Cabinets

- Filing Cabinets Storage Cabinets Conveyors Tool Stands Flat Drawer Files

- Display Equipment
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   Hanging Cabinets
   Welding Benches
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- Economy Locker Racks Welding Benches

- Ironing Tables



#### AND THE SECRET IS SCINFLEX!

Bendix-Scintilla\* Electrical Connectors are precision-built to render peak efficiency day-in and day-out even under difficult operating conditions. The use of "Scinflex" dielectric material, a new Bendix-Scintilla development of outstanding stability, makes them vibration-proof, moisture-proof, pressure-tight, and increases flashover and creepage distances. In temperature extremes, from -67° F. to +300° F., performance is remarkable. Dielectric strength is never less than 300 volts per mil.

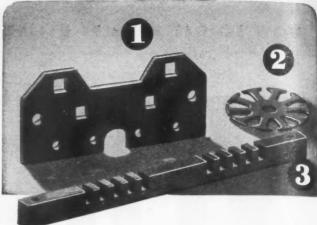
The contacts, made of the finest materials, carry maximum currents with the lowest voltage drop known to the industry. Bendix-Scintilla Connectors have fewer parts than any other connector on the market—an exclusive feature that means lower maintenance cost and better performance.

\*REG. U.S. PAT. OFF.

Write our Sales Department for detailed information.

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ACCURATELY-MACHINED
PARTS . . . quickly and
easily made with
TAYLOR
LAMINATED PLASTICS

The versatility of Taylor Laminated Plastics makes possible the fabrication of parts with structural, mechanical, and electrical properties to fit almost any engineering problem involving the mass-production of small, accurately-sized parts.

The three parts illustrated above, for example, selected at random from thousands of such parts being turned out daily in the modern Taylor plant, involve two different types of Phenol Fibre and one of Vulcanized Fibre. No. 1 is a switch back machined from Phenol Fibre and having excellent moisture-resistance and electrical properties. No. 2 is an end lamina for a fractional horsepower motor, punched and formed from Vulcanized Fibre. No. 3 is a coil bar support for a secret electronic device which is sawed, milled and drilled from Phenol Fibre having especially good insulating qualities and mechanical strength.

If your production problem involves great quantities of parts with light weight, great strength, and special insulating or dielectric qualities, let our engineers tell you what Taylor can do for you.

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PACIFIC COAST PLANT: La Verne, California

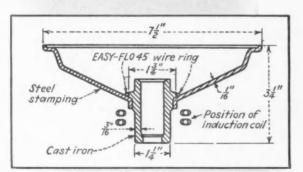
### Now-it's easy to braze CAST IRON

### with EASY-FLO plus KOLENE CLEANING



BRAKE POWER UNIT

Product of the French & Hecht Division, Kelsey-Hayes Wheel Company, Davenport, Iowa.



#### 235 ASSEMBLIES PER HOUR BRAZED WITH EASY-FLO 45

- Rough-machined cast iron cylinders mounted on racks are immersed in a Kolene solution at 820° F.
- After liberally brushing their joint surfaces with Handy Flux, cast iron cylinders and stamped steel housings are assembled in a 6-place fixture with a ring of 1/16" EASY-FLO 45 wire preplaced as shown in sketch.
- Fixture is placed in one coil of a 2coil induction heating unit equipped with automatic timer and change-over switch.
- 4. Using 2 fixtures—one loading while the other is heating—production flows along—235 assemblies per hour—with just ordinary unskilled operators.

Now, you can braze cast iron to cast iron—or to steel, stainless steel, nickel, copper, brass and bronze—as fast, reliably and economically as you can join other metals with the low-temperature silver alloy EASY-FLO.

Development of the Kolene cleaning process has licked the problem of preparing cast iron surfaces for brazing. This catalyzed molten salt bath process, not only removes dirt, grease, oil and oxides, but also takes out graphite and sand inclusions. The cast iron comes out with a pure ferrite surface over which EASY-FLO spreads instantly and uniformly, resulting in the same strong, ductile, leak-tight joints characteristic of EASY-FLO brazing.

The Brake Power Unit illustrated is one of many cast iron jobs successfully and profitably brazed with EASY-FLO plus Kolene cleaning. If joining cast iron is your problem, you'll want the facts about the EASY-FLO plus Kolene cleaning team.

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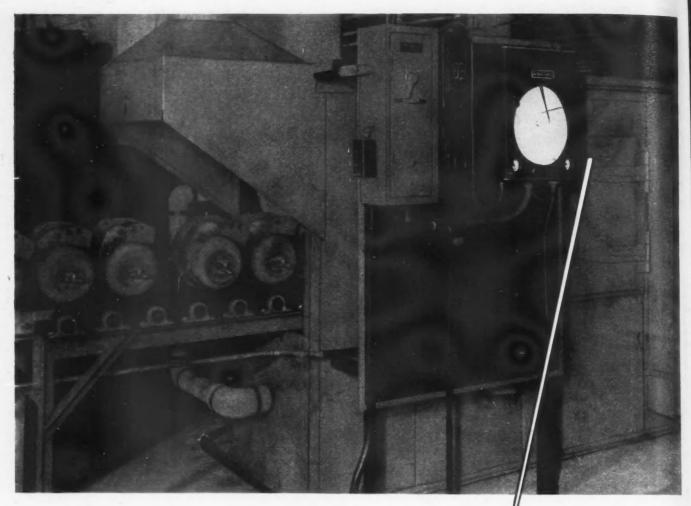


Here are two of the finished halves of the unit. Note the full penetration of alloy around the joints. Assemblies withstand a 300 lb.-ft. torque test and a critical air leakage test.

RE

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98



# For Simple and Effective Oven Control ... Use Brown Thermometers!

Simplicity and effectiveness can be combined in an oven control system.

Passing through this oven at Servel, Inc., in Evansville, Indiana, is an endless stream of uniformly heated refrigerator components. Close temperature control is required despite occasional large load changes.

Effective control is provided by a simple Brown Air-o-Line Control Thermometer. The advanced, simple design of Brown Thermometers is the reason for their unparalleled dependability record.

Servel, Inc., is well acquainted with the performance of Brown Thermometers. Several hundred are used on curing ovens, drying ovens and other devices throughout the Servel plant—providing effective measurement and control without an elaborate installation.

Where you have an oven in your plant, Brown Thermometers can provide dependable measurement and control at moderate cost. Contact your local Brown office or write to:

THE BROWN INSTRUMENT COMPANY, 4548 WAYNE AVE., PHILADELPHIA 44, PA. DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

Offices in principal cities of the United States, Canada and throughout the world.



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# FREE-MACHINING Resulphurized Alloy Steel

The addition of sulphur to certain alloy steels makes a noticeable improvement in their machinability.

This process, known as resulphurizing, gives better machinability without appreciably altering the longitudinal mechanical properties of these steels. Resulphurized steels are now used by many industries to speed up machining operations, to reduce production costs.

Bethlehem resulphurized steels are now manufactured in a variety of grades such as:

**AISI A-8641.** Free-machining, oil-quenching alloy steel similar to A-8640 but containing 0.04 to 0.06 sulphur.

AISI A-8620 modified. Free-machining, case-

hardening alloy steel with 0.04 to 0.06 sulphur content.

AISI A-4140 modified. Free-machining, oil-quenching alloy steel containing 0.06 to 0.10 sulphur.

In addition to these, many other AISI steels manufactured by Bethlehem can also be resulphurized to improve their machining qualities.

Find out more about Bethlehem resulphurized steels and how they can be used to advantage in your products. Our metallurgists will gladly furnish complete information. Write or phone.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation Export Distributor: Bethlehem Steel Export Corporation

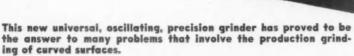
\* BETHLEHEM ALLOY STEELS





# The New GEARGRIND UNIVERSAL OSCILLATING PRECISION GRINDER





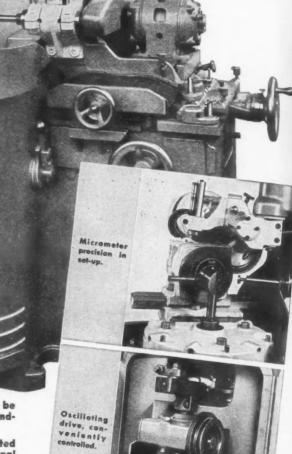
It grinds external and internal cylindrical surfaces, generated or formed spherical external and internal surfaces, external conical surfaces, internal tapers, barrel shaped surfaces, annular ball bearing races and fillets.

Fine finish is insured by the rigidity and precision construction of the machine.

#### WRITE FOR FOLDER

Illustrates features, set-ups for many types of work and gives complete specifications.



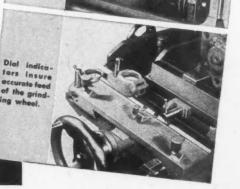


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UB RAILS—Trailer nose rub rail formed complete om hi-tensile alloy steel. Similar units are formed a variety of channel and compound channel assections.

ROOF SUPPORTS—Formed to close tolerance in hi-tensile steel. Similar parts are being supplied in quantity made from T and channel aluminum extrusions and welded tubing.

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### Curved Parts

in high-alloy materials

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For the Transportation Industries

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Bath forming methods will give you accurately duplicated parts, smooth formed at reasonable cost.

35 years of experience with metal forming equipment without a single strike or work stoppage mean dependable service.

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WINDOW CHANNELS — Illustrated above are aluminum sash frames formed for motor bus manufacturer. Most types a window frames, windshield frames an mouldings of various types can be accommodated.

#### THE CYRIL BATH COMPANY

**Metal Form Division** 

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**CLEVELAND 8, OHIO** 

HEELHOUSE ANGLES—Can be supplied to mpound radii, more than 180° around if reired, and curvature can be made in 2 mes where contours of mating parts reire

FRAME SUPPORTS—One of a series of formed aluminum channel frame members offset in 2 planes.

**STRUCTURAL MEMBERS**—Cab profile member of extruded aluminum is illustrated. Body posts, roof rails, body frame parts and a number of other structural members are being fabricated from aluminum and steel.









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Modern motors put exceptionally heavy burdens on gaskets. For maximum performance, it is now more important than ever that gaskets do a thorough job of tight sealing.

The materials, design and workmanship in Fitzgerald Gaskets are your guarantee of customer satisfaction. And selling these gaskets is a sure way to extra profit.



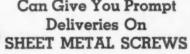
The Fitzgerald Manufacturing Company, Torrington, Conn. Branches, Chicago and Los Angeles — Canadian FITZGERALD, Limited, Toronto.

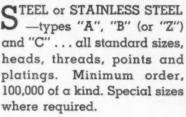


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THE COMPLETE LINE THAT COMPLETELY SATISFIES







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We shall be glad to quote you, also, on STANDARD MACHINE SCREWS

BRASS . . . 100,000 Minimum STEEL . . . 200,000 Minimum



EXCEPTIONAL facilities for making SPECIALS (Steel or Stainless Steel) to your specifications... or for converting your screw-machine parts to the cold forged process at substantial savings. Precision made to close tolerances; stronger, tougher, cheaper and more durable. All automatic secondary operations.

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On numerous problem draws, treatment of the work on the Bonderite line has been the answer to smooth, easy drawing.

The Bonderite coating has a great affinity for oil, holding it even under great pressures, thus providing positive lubrication. The nonmetallic crystals of the Bonderite act as a cushion between work and tools, as they are crushed and glazed in

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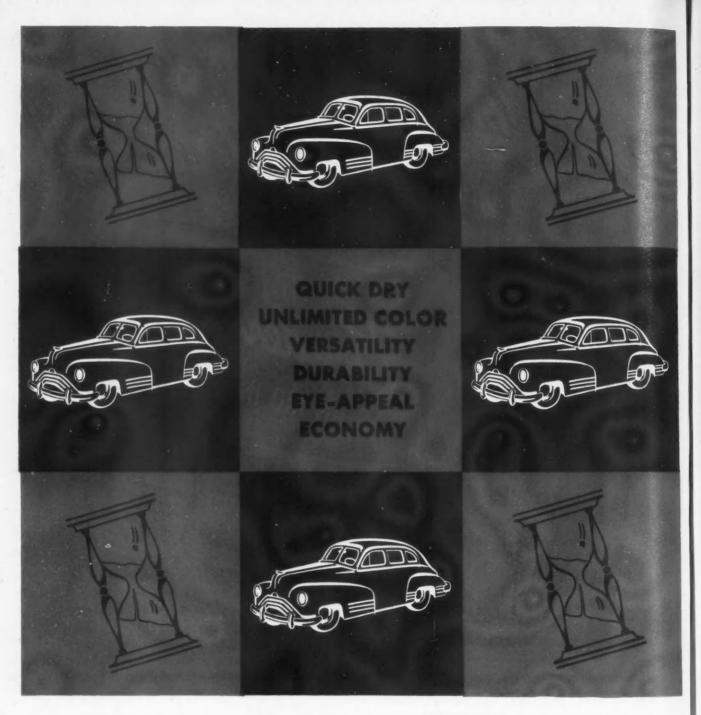
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Bonderite, Parco, Parco Lubrite-Reg. U.S. Pat. Off.

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- TOTAL OVERALL SAVINGS, per unit . . . \$1.00





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Hard Vulcanized Tube and Rod offers you these advantages:

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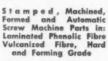


Lathe Turned and Screw

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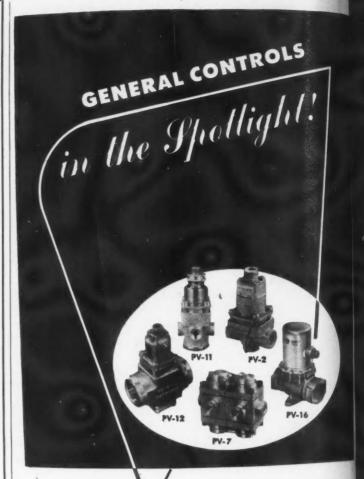
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Four quick change feeds. Wide range of geared tap leads.

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\*Illustrated Above: The internal splines, external splines and gear teeth are in perfect time with each other and concentric with each other and with bearing diameters within .001 F.I.R.



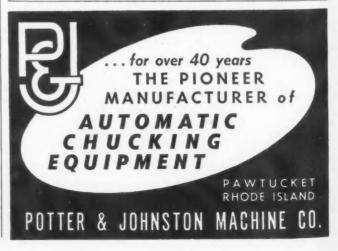


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Perhaps your product could benefit by a careful study of the varied forms, qualities and characteristics of the Revere Metals. The Revere Technical Advisory Service will gladly cooperate with you.

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Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N.Y. Sales Offices in Principal Cities, Distributors Everywhere.

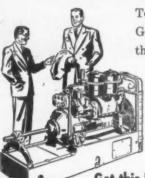
Here's a worth-while investment. Impregnated with carefully selected diamond grains of uniform size, insuring perfect finish with maximum efficiency, "Secomet" Diamond Wheels remove in the same time and at greatly reduced cost, five to six times the amount of carbides or hard metal that could be removed with a silicon arbide wheel.

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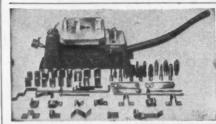
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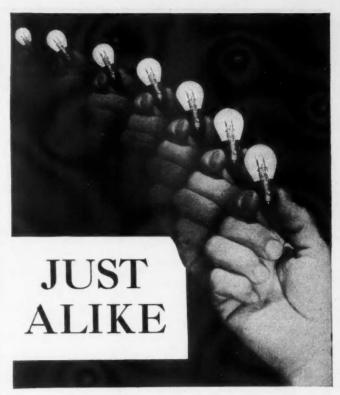
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IN the ten years since the present load capacity ratings of Timken tapered roller bearings were established, Timken bearings have been steadily improved. Improved so much that today the load carrying capacity of Timken bearings is a good 25% greater than it was 10 years ago!

As a result, The Timken Roller Bearing Company is now able to announce a 25% increase in the load capacity ratings of all Timken bearings—following a careful review of laboratory studies on fatigue life machines over the past ten years, together with close observation of bearing performance in the field.

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Now you can safely carry your present bearing loads on smaller size Timken bearings. Reductions in size of shafts and housings are possible. Products can be made more compact—lighter in weight. You have an opportunity to save both on bearing costs and material costs. And this increase in ratings should enable engineers to utilize the advantages of Timken bearings in an even broader variety of applications than has been practicable in the past.

#### Result of Constant Quality Improvement

This 25% increase in Timken bearing capacity ratings is based on continued

improvement in the quality of Timken tapered roller bearings over the past 10 years. It is due to a number of factors, including improved alloy steels made in our own Timken steel mill specifically for anti-friction bearings, better metallurgical control in the processing of this steel, more accurate manufacturing equipment, greatly improved surface finishes, and more accurate inspection methods. That these improvements in Timken bearing quality have resulted in 25% greater load capacity has been conclusively demonstrated by years of exhaustive laboratory and field studies!

#### New Engineering Journal to Give Facts

A new Timken Engineering Journal is now in preparation which will give

complete capacity rating tabulations and will also include new bearings introduced since the last publication. Pending publication of the new Journal you may take full advantage of the 25% capacity increase by multiplying the existing ratings by 1.25.

PRIL 1

For further assistance in the application of Timken bearings, call upon our field engineers or our Engineering Department.

Timken tapered roller bearings take any combination of radial and thrust loads, hold shafts in rigid alignment, assure precision and minimize friction. The 25% increase in load capacity ratings is the *latest* example of Timken leadership in serving the bearing needs of all industry... one more reason why it pays to look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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